NOTICE

All drawings located at the end of the document.

Closure Description Document for

RCRA Closure of Tank and Ancillary Equipment System

#9 in Building 771

U.S. Department of Energy
Rocky Flats Environmental Technology Site
EPA ID No. CO7890010526

Reviewed and Approved by:

T.C. Baker, Environmental Compliance, RMRS — Date: 10/6/99

Prepared by:

N.C.T. Van Tyne, P.E., IT Corporation — Date: 10/6/99

(U, NUM)
REVIEWED FOR CLASSIFICATION/UCNI
By S.T. Mathiesonnee, Classification Analyst
Date 12-07-99

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1.0 INTRODUCTION

1.1 Purpose and Scope

The Rocky Flats Environmental Technology Site's (RFETS) RCRA Closure Plan for Interim Status Units (Closure Plan) includes the Mixed Residue tank systems and the Idle Equipment tanks in Building 771. Decommissioning and removal of tanks and their ancillary piping and other equipment are subject to the Closure Plan and a subsequent Closure Description Document, which contains a description of the method of closure to be used. A two-step strategy will be employed: (1) wherever possible, meet the requirements for the "RCRA Stable" condition while the tanks remain in place, and (2) remove the tanks from the building at a later date.

The process piping in Building 771 has been divided into thirty-eight discrete "piping systems," with tanks and other ancillary equipment included. Thirty-five of these systems contain process piping connected to RCRA-regulated tanks. In order to prepare for building deactivation and to facilitate closure activities, each tank will be isolated by removing the process piping connected to it. Some tanks are connected to more than one process piping system. Once a tank has been isolated from **all** process piping systems to which it has been connected, it will be reported in the closure documentation as "RCRA Stable" if the requirements for the "RCRA Stable" condition, as described in the Closure Plan, have been met.

This Closure Description Document applies to Tank and Ancillary Equipment System #9 in Building 771, also known as Piping System #9, Special Recovery (Room 146). It applies to the closure of the Mixed Residue tanks associated with this system, which are listed in Table 1 in Section 4.0. Closure of the tanks will be accomplished in two separate phases:

a. Phase I: Removal of the majority of ancillary process piping connected to these tanks and completing the isolation of these tanks and their associated ancillary equipment. The tanks will meet the basic requirements for the "RCRA Stable" condition by being isolated as well as empty.

b. Phase II: Completion of RCRA closure of the tanks by removal of each isolated, "RCRA Stable" tank, along with any remaining ancillary piping or isolated ancillary equipment.

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1.2 Unit Closure Notification and Schedule

The Colorado Department of Public Health and Environment (CDPHE), Hazardous Materials and Waste Management Division, is hereby notified of the Site's intent to close the tank and ancillary equipment system identified in Section 4.0. The identified closure activities are expected to be completed within 180 days. If closure activities cannot be completed within 180 days, a request for extension will be submitted to the Division at least 30 days prior to the end of the 180 days.

Phase I activities for all systems are expected to be scheduled during the August 24, 1998 to December 30, 2001 time period. Phase II activities will be scheduled through the Rocky Flats Cleanup Agreement (RFCA) annual budget planning and Integrated Sitewide Baseline process.

Within 30 days after completion of Phase I or Phase II closure activities, a report will be submitted to CDPHE briefly summarizing the closure activities conducted in accordance with this Closure Description Document. The Phase I summary report shall contain the following:

- a declaration that the piping described in the submitted drawings has been removed as planned;
- descriptions of any significant deviations from this Closure Description Document;
- a copy of any newly-generated drawings;
- a statement as to whether the tanks involved have met the requirements of the "RCRA Stable" condition; and
- a summary of relevant analytical results.

The summary report for Phase II activities shall contain the following:

- details about the removal of "RCRA Stable" tanks from Building 771; and
- for mixed residue tanks, a statement that the unit is now clean closed.

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1.3 Facility Contacts

The contacts for closure activities at RFETS are:

Assistant Manager
For Environment and Infrastructure
Rocky Flats Field Office
U.S. Department of Energy
10808 Highway 93, Unit A
Golden, CO 80403-8200
(303) 966-4298

Division Manager
Environmental Systems
and Stewardship
Kaiser-Hill Company, L.L.C.
10808 Highway 93, Unit B
Golden, CO 80403-8200
(303) 966-9876

2.0 BUILDING 771 FACILITY DESCRIPTION

According to the *Building 771/774 Closure Project Decommissioning Operations Plan* (DOP) and its references, Building 771 was used for production activities involving plutonium and other actinides in a wide variety of processes between 1951 and 1989. During this time, there was considerable variation in the processes, as well as several upsets that resulted in radiological contamination of the facility.

The current scope of decommissioning activities under the DOP includes decontamination, stripout, removal, size reduction and packaging of process and utility equipment, such as gloveboxes, tanks, piping, etc., and demolition of internal non-load-bearing structures as necessary to facilitate these activities.

3.0 METHOD OF CLOSURE AND PERFORMANCE STANDARD

The tank systems described herein will be closed by the method described as "Unit Removal" in the Closure Plan for Interim Status Units, Section E, while incorporating the intermediate stage of "RCRA Stable," as described in Section F of the Closure Plan. All liquids will be drained from these tank systems, to the extent practicable, prior to the start of closure activities.

The Phase I performance standard for "RCRA Stable" shall be as follows:

a. The tanks are empty, i.e., they have been drained to the maximum extent possible using readily available means.
b. The piping sections shown in the applicable figures have been removed.

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c. Inlets to and outlets from the tank, except for the vacuum/vent line, have been isolated and contained, or locked and tagged out.

The Phase II performance standard is removal and waste packaging of the tanks and any remaining ancillary equipment.

4.0 UNIT DESCRIPTION AND WASTE CHARACTERIZATION

The piping for System #9 is located in Room 146, with a branch extending into Room 174. System #9 was part of the Special Recovery process, in which experiments were conducted using a variety of nuclear materials, and involved the transfer of acid- and organic-based solutions through various sections of the piping. Consequently, high levels of radioactive contamination are currently expected inside the piping.

An "Initial Characterization " sheet is included as Attachment 1, with a narrative description in Section K and a description of piping removal scope in Section L. Equipment drawings are attached as Figures 1-23. Although a variety of chemical liquids are mentioned in Attachment 1, Section J, the only liquids of concern are nitric acid and tributyl phosphate/dodecane.

The total length of piping to be removed during Phase I is **estimated** to be 3,000 feet. In addition to the piping, 13 valves will be removed. One hundred seventy-four termination points (TPs) are also indicated in Figures 1-23, and are numbered consecutively within each subsystem except within Subsystem #3. Containment at the TPs will be designed and implemented to protect the room environment from release of contaminants remaining in disconnected systems. Significant changes to Figures 1-23 will be submitted to CDPHE with the Phase I summary report.

During Phase I closure activities, all solution fill, drain and transfer lines indicated in Figures 1-23 will be disconnected and removed from the tanks. The vacuum/vent lines will be left in place during Phase I activities, with the valves in the vent position. At the completion of Phase I closure activities, the tanks listed in Table 1 are expected to meet the requirements of the "RCRA Stable" condition and this condition will be documented in accordance with the Closure Plan.

Detailed information about the tanks in System #9 is given in Table 1 on the next page:

Table 1: Mixed Residue Tanks in System #9

Tank No.	Tank Type	RCRA Unit #	Diameter (in.)	Height (ft.)	EPA Codes
D-1001	Pencil	93.035	5	8	D002, D006, D008
D-1002	Pencil	93.036	5	8	D002, D006, D008
D-1003	Pencil	93.037	5	8	D002, D008
D-1004	Pencil	93.038	5	8	D002
D-1005	Pencil	93.039	5	8	D002
D-1006	Pencil	93.040	5	8	D002
D-1009	Pencil	93.043	5	8	D002
D-1010	Pencil	93.044	5	8	D002, D006, D008, D010, D011
D-1011	Pencil	93.045	5	8	D002, D006, D008, D010, D011
D-1012	Pencil	93.046	5	8	D002, D006, D008
D-1019	Pencil	No #	5	7	D002, D008
D-1020	Pencil	No #	5	7	D002, D008
D-1032	Pencil	93.049	5	3.5	D002, D008
D-1062	Pencil	No #	5	3.5	D002
D-1063	Pencil	No #	5	3.5	D002, D008
D-1064	Pencil	No #	5	3.5	D002
D-1065	Pencil	93.051	5	3.5	D002
D-1066	Pencil	93.052	5	3.5	D002
D-1007	Raschig ring	93.041	2	5	D002, D008
D-1008	Raschig ring	93.042	2	8.3	D002
D-1013	Raschig ring	93.047	2.5	4.5	D002
D-1014	Raschig ring	93.050	2.5	4.5	D002, D008
D-1022	Raschig ring	93.048	2	8.3	D002
D-1023	Raschig ring	No #	2	8.3	D002, D008
D-1024	Raschig ring	No #	2	8.3	D002

EPA waste code D002 (corrosivity) is assigned to the liquids and removable sludges present in this system. Additional EPA waste codes have been assigned

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to other tanks in the system, as indicated in Table 1, based on process knowledge. If additional samples of liquids are recovered from piping during the Tap and Drain Project, they will be analyzed and their results will be used to re-characterize the residual liquids in this system. Successful removal of liquids and/or sludges from the piping will render it non-hazardous.

Tank D-1067 is listed in Attachment 1, Section F, but is not included in Table 1 because it is a vacuum trap and is not a Mixed Residue tank. Tank D-1081 in Room 174 is also listed in Attachment 1 as the endpoint for piping removal in System #9, but it is actually part of System #10. A vent tap will be installed at the high point in the transfer line from Room 146 to tank D-1081, in order to drain and vent the transfer line during Phase I activities for System #10. The transfer line is shown in Figure 10, with the vent tap located near TP 3/23 as V/P-3/1.

This system contained highly radioactive liquid; therefore, significant internal radioactive contamination is anticipated. Prevention of release and minimization of work exposure will be addressed in the preparation of the Integrated Work Control Program (IWCP) work package, as described below.

5.0 SPECIFIC CLOSURE ACTIVITIES

Activities will be designed to achieve the closure performance standard, protect human health and the environment, and minimize waste. Specific work instructions, with engineering, health and safety, and waste management information, will be developed prior to the start of identified Phase I or Phase II closure activities. These instructions will be developed in accordance with applicable RFETS policies and procedures.

Closure activities are summarized as follows:

5.1 Establishment of Tank System Boundaries and Scope of Removal for Phase I

The boundaries for System #9, as described in Attachment 1, define the extent of closure activities for this closure description document. The boundaries are at or near flanged joints. At TPs where release of contamination and worker exposure are of concern, a relatively short pipe stub (length is dependent on field conditions) which is external to the joint may be used. This type of TP will be sealed and therefore contained by two layers of plastic sleeving taped to the stub. For tank drain lines, a "U"-shaped section may be left, so that the TP is on a vertical riser.

During Phase I closure activities, all overhead piping between the joints nearest the tank outlets and those nearest the points of entry into the gloveboxes will be removed, and the remaining piping capped as described above. The tanks themselves and all remaining ancillary piping and equipment (e.g., pumps, heat exchangers, actuators) are expected to be removed during Phase II closure activities. The tanks in System #9 are currently intended for removal as part of D&D Sets 36A-G inclusive.

System #9 piping located inside gloveboxes will be removed when the glovebox is disassembled, to minimize worker exposure and cost. At that time, the waste will be characterized and managed accordingly.

5.2 Preparation of Engineering and IWCP Work Packages (Phases I and II)

A unit-specific IWCP/engineering work package will be prepared for System #9. The RFETS Health and Safety Practices Manual defines the general health and safety measures to be followed at the Site. Closure activities will be conducted in accordance with this manual, incorporating the results of job-specific industrial and nuclear safety-related evaluations and screens.

The IWCP/engineering work package will be used to control work, including preparation of equipment, specification of personal protective equipment, methods of pipe removal and size reduction, methods for containing liquids and preventing releases to the environment, and waste packaging.

As Low As Reasonably Achievable (ALARA) principles will be followed regarding personnel exposures to radiation. Radiological containment will be provided during pipe cutting activities by the use of soft-sided structures such as glovebags, sleeves and/or portable housing. Larger containments may be constructed for disassembly and size reduction of tanks and associated equipment. Following size reduction, equipment pieces will be inspected and placed into a waste container.

Air pressure inside of larger containment will be maintained negative to the room air through the use of a portable air mover or by connection to the building exhaust system. Each process room is maintained at negative pressure relative to the surrounding building or outside atmosphere by the building room exhaust system, which prevents the escape of radiological or hazardous substances to the environment. The exhaust from the air mover will pass through a filter, if necessary, to trap particulates.

5.3 General Methodology for Piping Removal during Phase I

Prior to starting Phase I pipe removal activities, System #9 will be vented, purged, drained and then drained again by tapping into low points, if required, until no additional liquid can be removed. The system should then be free of liquids. However, it is possible that residual liquids may be encountered during piping removal. The removal method employed will include provisions to contain residual liquids and/or sludges, which may contain high levels of radioactive contamination. Any resulting liquids or sludges will be characterized and treated for final disposal per waste acceptance criteria.

If a blockage is encountered that cannot be cleared readily during the tap and drain process, additional taps will be installed to minimize the length of the blocked section. Blocked sections will be removed with provisions to contain trapped liquids that may be present. These sections will be size reduced in a manner that accommodates the possibility that trapped liquids may be released to containment. A drainage path will be established through any remaining blockages to ensure that all liquid can be drained from the section. If significant blockages are encountered during tap and drain activities, piping removal may be conducted in conjunction with those activities.

Piping removal, size reduction and packaging activities are considered to be dynamic processes, in which improvements in technology will be implemented as a result of newly available methods or lessons learned from prior piping removal operations. The piping removal steps described below may be modified in response to actual operating conditions. Possible modifications include the manner in which the pipe sections are separated, the type of containment used as a pipe section is removed, the manner in which vacuum is applied and the type of containment used for size reduction.

In the majority of cases, piping will be removed in the following manner:

a. A glovebag or plastic sleeving will be installed around the section of piping to be removed.
b. Vacuum will be applied at one or both ends of a pipe section, and removal will proceed toward a vacuum source.
c. At a TP, the flange will be disconnected or the pipe cut and the remaining pipe stub will be contained by two layers of plastic.

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d. The pipe sections will be separated by the best available method (e.g. disconnecting at the flanged joint, four-wheel cutter, pipe-crimping tool).
e. After the pipe section ends are separated from the rest of the pipeline, the ends of the glovebag/sleeving will be twisted into a "pigtail" formation, from which the ends of the bag can be cut and taped. The pipe section can now be removed with taped plastic containment at both ends.
f. If any residual liquid or sludge is observed at either end of the removed pipe section, that section will be immediately bagged into the size reduction containment, to be size reduced and inspected. The recovered residual liquid and/or sludge will be collected, then stored in an approved RCRA storage area.
g. If no residual liquid or sludge is observed at either end of the pipe section, it will be brought to the size reduction area at an appropriate time.
h. Piping sections will be size reduced, as necessary, using an approved cutting method. Crimped pipe sections must be size reduced.
i. Pipe sections will be allowed to drain, in a vertical position, as required.
j. Pipe section ends will be inspected visually to determine whether a blockage is present within the section.
k. Blockages in pipe sections will be penetrated by mechanical means to drain any trapped liquid.
l. Pipe sections will be drained of any remaining liquids or sludges, then placed into waste containers. Residual materials will be sampled and immobilized.

The contents and condition of the interior of the pipe section will dictate its disposition as waste. Three typical cases may be encountered:

- The interior surface is dry and contains no visible sign of hazardous waste holdup, so that the pipe section can be disposed as non-hazardous waste.
- The pipe section contains solid residual material adhering to the interior walls, which cannot be removed readily. The pipe section will be managed as hazardous or non-hazardous waste, after a hazardous waste determination has been made on the basis of the analytical results for a representative sample of the material.
- A removable blockage or mobile sludge is found, and is removed from the pipe section and sampled. EPA codes are assigned to the sludge based on process knowledge or analytical results, and the sludge is treated to meet applicable waste acceptance criteria. The pipe section

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will be disposed as hazardous or non-hazardous waste, after a hazardous waste determination has been made.

Each IWCP work package, which will be prepared prior to the start of closure activities, will include more specific and detailed instructions for the sequence of piping removal steps, removal and size reduction methodology, and removal of residual materials from pipe sections.

5.4 Preliminary Considerations for Phase II Tank Removal

After the removal of the piping in System #9, all process piping will have been removed from the tanks and they will have been drained of readily removable liquids. Additional information about specific features of tank removal will be submitted in an addendum to this CDD.

Removal of the tanks can be described by the following major steps:

a. Containment is placed around the vacuum/vent line, and it is disconnected from the exhaust header.
b. A decision is made to move the tank to the size reduction facility or to size reduce it in place. This decision is based primarily on the size of the tank.
c. If the tank is to be size reduced in place, containment is constructed around it in situ. Raschig rings and any residual liquid and/or solid material are removed and the interior of the tank is wiped dry.
d. If the tank is small enough not to require size reduction in place, it is disassembled from the floor mountings and is brought to the size reduction facility. Raschig ring removal and tank cleaning is conducted in the size reduction facility.
e. The tank is size reduced, as necessary, and segregated for final waste characterization and packaging.
f. Characterization of the tank pieces will be driven by analytical results for residual liquids or sludges associated with them.

6.0 SAMPLING AND ANALYSIS

Sampling and analytical methods, and quality assurance standards, are addressed in this section.

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6.1 Sampling Methods

Methods used to collect samples are authorized in 6 CCR 1007-3, Part 261, Appendix I, and the Liquid Residue Treatment Waste Characterization Plan for Process Piping Removal. Specific methods will be selected on the basis of ease with which representative samples can be collected, sampling location, sampling matrix, sample container type and size, and accessibility, as well as to maximize the value of data and minimize the number of samples needed.

Sampling of liquids is performed using the procedure entitled, Solution Bottle Handling Building 771, PRO-D02-CO-1131. The solution is mixed while in a bottle to assure homogeneity prior to sampling. Solid material sampling is performed using the procedure entitled, Laboratory Sampling Procedure, CAS-SOP-003.

6.2 Analytical Methods and Location

Analytical work will be performed in an RFETS approved laboratory. The analytical test methods for waste characterization are consistent with the approved methods in the Site RCRA Part B Permit, Part VI, Waste Analysis Plan.

6.3 Quality Assurance

The applicable RFETS Field Operating Procedure, 5-21-000-OPS-FO, or equivalent procedure(s), will be used to ensure the integrity of representative samples and analytical data.

7.0 DISPOSITION OF CLOSURE-RELATED WASTES

Metal, combustible and liquid/sludge wastes may be generated during either Phase I or Phase II closure activities. It is assumed that the Site waste management and treatment systems will be available to receive wastes generated by these closure activities.

Tank system components and pieces which are radioactively contaminated will be managed in accordance with the requirements of the RFETS Radiological Control Manual and Health and Safety Practices Manual, and will be packaged for disposal in accordance with applicable waste acceptance criteria. All metal waste from this system is expected to be either low level waste (LLW) or transuranic waste (TRU), depending on the amount of actinide present, and will be

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characterized in accordance with applicable regulations. Tank system components and pieces completely free of any holdup will be managed as non-hazardous waste because there were no listed wastes in this system, and their materials of construction do not exhibit any characteristics of a hazardous waste. If the metal waste is determined to be hazardous debris, then an approved extraction technology may be implemented; however, hazardous debris is not expected for System #9.

Wipes and other combustible materials that are used to clean surfaces or to immobilize free liquids will be placed into waste drums, characterized and managed in accordance with applicable regulations. Other combustible wastes, including PPE and plastic containment void of any hazardous constituents, will be managed as non-hazardous radioactive waste. All waste drums will also be analyzed by non-destructive assay to categorize them as LLW or TRU and they will be stored in an appropriate onsite storage area prior to offsite disposal.

The only liquids expected to be generated during Phase I or Phase II closure activities are the residual liquid holdup in the equipment, which may be either **aqueous** (water-based and containing no organics), or **organic** (i.e. containing mixtures of tributyl phosphate and/or dodecane). All liquids, whether **aqueous** or **organic**, will be drained into 4-liter bottles, sampled and analyzed for RCRA characteristics. The bottles will be placed into permitted or otherwise compliant storage areas and managed in accordance with applicable regulations. **Aqueous** liquids may be transferred from bottles to tank D-544 or D-545, which are the temporary storage tanks for acids or caustic, respectively, or the bottles may be transferred to the Miscellaneous Cementation treatment process or the Caustic Waste Treatment process. Non-hazardous aqueous process liquid may be discarded through the process drains. **Organic** liquids will be managed in compliant storage areas until a viable treatment option can be developed. Depending on its radioactive content, either the TRU/TRM Waste Project manager or the Site Treatment Plan project manager will be notified of the generation of this waste.

Any liquid or mobile sludge found in components during closure activities will be removed or immobilized in situ prior to packaging for disposal, in accordance with applicable waste acceptance criteria. Sampling of the sludge may be necessary to characterize it properly. System components containing solidified sludge that adheres to the interior walls will be characterized using analytical results for a representative sample of the sludge and managed in accordance with applicable regulations. The sampling protocol and number of sampling locations will be determined if solid residual material actually is encountered, and will be based on the Waste Characterization Plan.

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8.0 SOIL CONTAMINATION EVALUATION AND POST CLOSURE CARE

The operating history for these tank systems (e.g., building logs, RCRA inspection logs and occurrence reports) indicates that there have been no spills or releases to the environment as a result of waste management activities in these units. Phase I and Phase II closure activities associated with these tank systems are not expected to impact the soils surrounding Building 771. Therefore, soil contamination will be evaluated as part of decommissioning and cleanup activities for the Building 771 complex under RFCA, and post-closure care activities are not necessary as part of the closure of these tank systems.

9.0 RECORDKEEPING

The following closure records will be maintained onsite during closure activities, and at a federal repository for a minimum of 30 years following the report of closure:

- sampling logs, including type, numbers and date of samples;
- analytical results;
- records of actions taken to decontaminate equipment and/or structures;
- work instructions used to conduct closure activities;
- closure report for Phase I activities; and
- documentation verifying that closure activities were conducted in accordance with the approved Closure Plan and with this Closure Description Document, following completion of Phase II activities.

10.0 AMENDMENT OF THE CLOSURE DESCRIPTION DOCUMENT

In conducting Phase I or Phase II closure activities, unexpected events that are identified during the implementation of closure activities may require an amendment to this Closure Description Document. Modifications to this Closure Description Document will be made in accordance with applicable regulations.

During the planning and development stage of Phase II closure activities, additional drawings that are developed for the removal of tanks and remaining ancillary equipment will be submitted as an addendum to this Closure Description Document. This Closure Description Document may be augmented or superceded by an approved Building 771 Decommissioning Operations Plan (DOP).

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11.0 REFERENCES

1. Code of Colorado Regulations, Vol. 6, No. 1007-3, Part 265, Subpart G, Sections 265.110 through 265.120.
2. Rocky Flats Environmental Technology Site RCRA Permit, Part X: Closure Plan, effective 5/10/98.
3. Rocky Flats Environmental Technology Site Closure Plan for Interim Status Units, effective 7/98.
4. Rocky Flats Environmental Technology Site 1997 Hazardous Waste Tank Systems Management Plan, effective 2/13/98.
5. Backlog Waste Reassessment Baseline Book, an RFETS Level 1 Manual, effective 2/17/98.
6. Building 771 Basis for Operation (BFO), 98-RF-00947, effective 2/27/98.
7. Building 771 Liquids Process Piping Removal Waste Characterization Plan, Rev. 0, 12/3/98.

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Attachment 1: Initial Characterization for System #9

BUILDING 771TAP & DRAIN/PROCESS PIPING REMOVAL CHARACTERIZATION SHEET

SYSTEM NUMBER	NAME	ENGINEER	REVISION DATE
9	SPECIAL RECOVERY ROOM 146	JENNIFER TRUJILLO	09/22/99

A. START POINT	Room 146, Gloveboxes MT-1, MT-2, MT-3, MT-4, MT-7, and MT-8
B. END POINT	Room 174, Tank D-1081
C. CHEMICAL COMPOSITION	0.35N - 12N HNO_3 TBP/Dodecane
D. RAD/ACTINIDE CONTAMINATION	Waste piping $<10^{-3}$ g/l Pu/U/Np Process piping > 6 g/l Pu/U/Np
E. ESTIMATED SYSTEM MAX VOLUME	29 Liters
F. TANKS INVOLVED	D-1001, 1002, 1003, 1004, 1005, 1006, 1009, 1010, 1011, 1012, 1019, 1020, 1032, 1062, 1063, 1064, 1065, 1066, and 1067 (Pencil Tanks) D-1007, 1008, 1013, 1014, 1022, 1023, and 1024 (Raschig Ring Tanks)
G. GLOVEBOXES INVOLVED	MT-1, MT-2, MT-3, MT-4, MT-7, and MT-8
H. OTHER COMPONENTS	Glovebox MT-3: Precipitation vessel MT-3B Glovebox MT-4: Evaporator, slop pot, filtrate receivers, gear pump, and 7 ion exchange columns Glovebox MT-7: Glass tanks; Ferrous Sulfamate, Ammonium Sulfate, Strip Solution, T-1015, 1016, 1017, and 1018
I. SYSTEM INTERFACES	Cooling Water Heat Exchangers 1071 and 1072 Process Cooling Water Steam/Steam Condensate System 3/Room 181A, Special Recovery (Room 146) System 6, Evap/Batch/Precip System 10, Uranium Recovery (Room 174) System 21, 12N Nitric System 34, Acid Waste Lines (Building 771→774) System 37, House Vacuum
J. CHEMICAL COMPATIBILITY AT INTERFACE(S)	MT-1: Aluminum Nitrate $Al(NO_3)_3$ Hydrofluoric Acid HF Nitric Acid HNO_3

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Attachment 1, cont.: Initial Characterization for System #9

J. CHEMICAL COMPATIBILITY AT INTERFACE(S) (continued)

MT-2: Ascorbic Acid $C_6H_8O_6$
Hydrofluoric Acid HF
Nitric Acid HNO_3
Oxalic Acid HO_2CCO_2H
Potassium Hydroxide KOH
Sodium Carbonate Na_2CO_3

MT-3: Aluminum Nitrate $Al(NO_3)_3$
Ammonia NH_3
Dodecane $CH_3(CH_2)_{10}CH_3$
Hydrofluoric Acid HF
Nitric Acid HNO_3
Tributyl Phosphate TBP

MT-4: Aluminum Nitrate $Al(NO_3)_3$
Ferrous Sulfamate $Fe(SO_3)NH_2$
Nitric Acid HNO_3
Sodium Nitrite $NaNO_2$

MT-7: Ammonium Sulfate $(NH_4)_2(SO_4)$
Dodecane $CH_3(CH_2)_{10}CH_3$
Ferrous Sulfamate $Fe(SO_3)NH_2$
Nitric Acid HNO_3
Nitrogen N_2
Sodium Carbonate Na_2CO_3
Tributyl Phosphate TBP

Systems 2, 4, 5, 8, 19, 20, and 32 have been stripped out in Room 146. Systems 3 and 21 should have been removed by the time the work package for System 9 draining is activated.

Milliliter quantities of various reagents (i.e. hydrofluoric acid, ferrous sulfamate, aluminum nitrate, etc.) would be added to liter quantities of solution as catalysts in chemical reactions. These small reagent quantities are considered compatible with the tank draining activities for this system at the time of this writing. Sampling of the piping prior to tank draining will further categorize this systems solution.

Subsystem 6 contains TBP/dodecane and should be collected and stored separately from other solutions collected in the remaining subsystems until such time that analytical sample results identify compatibility.

K. NARRATIVE DESCRIPTION

Room 146 Special Recovery was used primarily to recover uranium and neptunium from plutonium through dissolution, ion exchange, and solvent extraction processes. As Room 146 also contained experimental operations that were conducted without procedures, this characterization is providing guidance based on known operations that were conducted in this area. Chemical compatibility will be maintained as a result of the sampling required prior to draining the system.

There is approximately 3000 feet of primarily ½" 1" stainless pipe associated with this system.

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K. NARRATIVE DESCRIPTION (continued)

Glovebox MT-1 dissolved small batches of plutonium/neptunium oxide in four liters of 12.5N nitric acid with 20 milliliters of 48% hydrofluoric acid. 200 milliliters of aluminum nitrate was added to the solution to complex the HF. The filtered solution was transferred to Tank D-1007 or 1032. The solution would be batched and processed in Glovebox MT-4 ion exchange columns, in a similar method as is listed in the narrative for MT-4 operations.

Glovebox MT-2 dissolved salts from molten salt extraction, direct oxide reduction, and electrorefining in Teflon or Pyrex glass beakers. Three forms of dissolution/precipitation were performed in MT-2.

Carbonate precipitation used 1.0M hydrochloric acid to dissolve the salts. The dissolved and filtered solution would be contacted with 2M sodium carbonate at 90° C. The plutonium and americium would precipitate as a carbonate. The filtrate would be collected in Tank 1037 and 1038. If the filtrate was below discard, the solution would be transferred to Tank D-207 in Room 149. The carbonate precipitate would be calcined to an oxide on a hot plate or in a furnace. Filtered residue heels were dissolved in 12N Nitric acid with 0.1M HF, and transferred to a nitrate storage tank.

Oxalate precipitation dissolved salts in 0.25M hydrochloric acid. Up to approximately 100 grams per liter of solution of oxalic and 5 grams per liter of ascorbic acid would be added to filtered solution at 50° C. The precipitate would be filtered and calcined, with the filtrate collected in Tanks D-1037 and 1038. Below discard filtrate would be also be transferred to tank D-207 in Room 149.

Caustic leaching would precipitate salt residues that contained low quantities of magnesium with 0.2M potassium hydroxide approximately 90° C. The cooled filtrate would be filtered with the discard KOH transferred to Tank D-921 or 922 through the MT-2B transfer line. The solid residues would be dissolved with nitric acid/HF or sulfuric acid, depending on the residue type, precipitated, and dried.

Glovebox MT-3 was used to dissolve batches of mixed plutonium/uranium oxides in three liters of 12N nitric acid, 15 milliliters of hydrofluoric acid, and 110 milliliters of aluminum nitrate, as needed, to complex fluoride ions. The dissolved solution was transferred to Tanks D-1009, 1010, 1011, and 1012. The feed was batched and processed in Glovebox MT-7, Solvent Extraction.

MT-3 operations also included the precipitation of uranium strip solution. Tank D-1065 stored the uranyl sulfate strip solution generated from the solvent extraction process in MT-7 and SRS-14. The solution was transferred to the precipitation vessel in Glovebox MT-3B and precipitated with ammonia gas. The ammonia gas was neutralized in the D-1067 nitric acid scrubber. The filtrate was collected in Tanks D-1064 and 1066. If the filtrate was below the discard limit it was transferred to tank D-1013.

Glovebox MT-4 was primarily used for various ion exchange operations, and the evaporation of solutions generated from the ion exchange process. Nitric acid solutions containing plutonium, uranium and other elements would be batched to 7.5N nitric in tank D-1007, 1008, or 1022. 200 milliliters of ferrous sulfamate and 100 grams of sodium nitrite would be added per kg of feed, and one liter of aluminum nitrate would be added to the tanks overall volume.

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K. NARRATIVE DESCRIPTION (continued)

The four ion columns in Glovebox MT-4 were then loaded from the bottom to the top, in series, with the batched feed. The effluent, or discard solution from the load cycle was collected in tanks D-1013.

When the columns were nearly loaded, they were washed in the same direction with 7N HNO_3, with the wash solution also collected Tank D-1013.

When the solutions from the Load and Wash cycles met the economic discard limits, the tanks contents would be vacuum transferred to tank D-1014 for sampling and shipment to Building 774, Liquid Waste Treatment.
If the solutions from the Wash or Load cycle did not meet the economic discard limit, the solution would be recycled back to the feed tanks.

The columns were next Pre-eluted with 0.35 HNO_3 from top to bottom, with the recycle solution collected in tanks D-1007, 1008, or 1022. When full, these tanks were vacuum transferred back to the feed tanks for re-batching and loading onto the ion exchange columns.

The columns were then eluted, releasing the plutonium from the resin. The eluate was collected in Tank D-1024. The eluate would then be sampled and transferred to Room 114 or 149 if the results were within given perimeters.

The columns would then be post-eluted, with the solution collected in Tank D-1007, 1008 or 1012.

Finally, the columns would be reconditioned from bottom to top with 7N HNO_3, with the solution also collected in tanks D-1007, 1008, or 1012. The columns were now ready for the Load Cycle again.

MT-4 also has a steam heated evaporator in the glovebox. The evaporator was fed from the filtrate receiver tanks inside Glovebox MT-4B. The evaporator bottoms were collected in Tanks D-1001, 1002, and 1003, with the distillate collected in Tank D-1013.

MT-7 was the solvent extraction operation. The modified Purex solvent extraction process extracted Uranium from 4.5N nitric acid solution containing the uranium/plutonium and extraneous metallic ions into a organic phase, which was 30 % by volume TBP in dodecane. Processing took place in Tanks D-1015, 1016, 1017, and 1018.

Tanks D-1015, 1016, 1017, 1018, and 1065, associated piping in Glovebox MT-7, along with the transfer line between Gloveboxes MT-3 and MT-4 (Transfer Line #5) are expected to contain two phased liquids (TBP/dodecane and nitric acid). Liquids from this subsection are to be collected separate, and not mixed with any other solution until sample analysis prove compatibility. The expectation of two phased liquids is based upon the known migration of TBP/dodecane (organic) within Glovebox MT-7 and associated solvent extraction piping and tanks.

Glovebox MT-8 itself is not included in this system. MT-8 is a new glovebox that is not contaminated, with a new transfer pipe to Tank D-1022 blanked off, and not attached to any of the actinide or reagent piping. The glovebox was designed for dissolution operations.

K. NARRATIVE DESCRIPTION (continued)

Vent Purge, Tap & Drain (VP/TD) Recommendations:

VP/TD should be performed using the Sub system Method. System 9 is so large that the piping systems needed to be broken down into smaller, more manageable segments.

VP/TD should also be performed in two sections, to try and segregate the Pu/U/Np nitrate, and the uranium/TBP/dodecane streams from each other, until such time that analytical analysis verifies chemical compatibility.

Criticality Engineering approval must be obtained before removing the LO/TO on Raschig ring filled tanks (D-1007, 1008, 1013, 1014, 1022, 1023, and 1024). Criticality controls are required to ensure that the tank levels are monitored for level increases during tank draining. These details shall be spelled out in the IWCP package.

Ensure that all glass vessels located within gloveboxes are visually verified as empty of solution. Drain line piping is considered to have residual liquids in them if the drain valve is not in the open position, and open to the glovebox.

Flanges may not be broken, and/or Taps may not be installed on piping at low points inside gloveboxes. Draining the piping by vacuum will be performed as applicable, with the majority of internal glovebox piping and residual liquids remaining for removal during the D & D process.

Piping should be VP/TD from the highest to the lowest points where possible.

Tap points and the final sequence of steps in the IWCP package may differ from this description, and may not be determined until the later stages of the Enhanced Work Planning process.

All drawings referenced in this description are SK-T0100394 series unless stated otherwise.

SECTION 1: PU, PU/U & PU/Np NITRATE
Subsystem 1, Tanks D-1001 through 1006

Vacuum/vent, fill, and drain line for Tanks D-1001 through 1006 back to Glovebox MT-4 (Drawing 01 & 02)

Subsystem 2, Tanks D-1007 and 1008

Cycle the vacuum/vent valve on D-1007 (Drawing 04)

D-1007 fill ,include the funnel (HV-1521) back to Glovebox MT-4 (Drawing 3, Detail A)

D-1007 fill (HV-1518) back to Glovebox MT-4 (HV-3143)
HV-3143 (MT-4) back to HV-3254 (MT-4)
D-1007 fill (HV-1518) back to Glovebox MT-3 (HV-3249)
D-1007 fill (HV-1518) back to MT-1
D-1007 fill (HV-1518) back to MT-4 (HV-3261)
HV-3261 (MT-4) back to each of the three connections in MT-2 (Drawing 03)

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K. NARRATIVE DESCRIPTION (continued)

Subsystem 2, Tanks D-1007 and 1008 (continued)

D-1014 fill (HV-1912) back to Glovebox MT-4 (HV-3277)
D-1014 drain (HV-1916) back to Glovebox MT-4 (HV-3277)
D-1013 drain (HV-1504) back to Glovebox MT-4 (HV-3277)
D-1007 fill (HV-1517) back to Glovebox MT-4 (HV-3277)
(Drawing 07)

D-1007 drain (HV-4172) back to Glovebox MT-4
D-1007 drain (HV-4171) back to Glovebox MT-1
(No matter where a tap is installed there is expected to be liquid left in the piping in the concrete floor, which at the time of this writing will remain for removal by D & D)
(Drawing 03, Detail B)

Vacuum/vent line from D-1007 back to Glovebox MT-4
(Drawing 05, Detail B)

Tank D-1008 fill back to Glovebox MT-4 (HV-3167 then HV-3050)
Tank D-1008 fill back to Glovebox MT-3 (HV-3223 then HV-3209)
HV-3209 (MT-3) back to the valve in MT-1
Tank D-1008 fill back to the three outlets in Glovebox MT-2
D-1008 drain back to Glovebox MT-4 and the manifold (HV-3129 and HV-3049)
(Drawing 05)

Ensure that LO/TO is in place for the process water and 12N nitric acid line that are directly attached to the manifold
Use process knowledge to modify the piping, remove the piping from D-1008 drain at the union below HV-3144 in Glovebox MT-4, and drain the manifold piping
(Drawing 06)

Ensure that the 7 ion columns, 2 filtrate receivers, slop pot, and evaporator are empty
(Drawings 06A, 06B, and 06C)

Subsystem 3, Tanks D-1013, 1014, 1019, 1020, 1022, 1023, and 1024

Cycle the vacuum/vent valves for tanks D-1013, 1014, 1022, 1023, and 1024 (vent line to Tank D-1024 has been removed)
(Drawing 12)

The new transfer line between Glovebox MT-8 and D-1022 fill is blanked at Glovebox MT-8. Do **NOT** remove the blank, as the glovebox is **NOT** internally contaminated (i.e., tap just above the blank on Glovebox MT-8)
Sample tap on Tank D-1022 (HV-1509)
Sample tap on Tank D-1023 (HV-1910)
(Drawing 08)

Tank D-1013 fill (HV-1503) back to Glovebox MT-4 (HV-3177)
Tank D-1013 fill (HV-1503) back to Glovebox MT-4 (HV-3264)
(Drawing 09)

K. NARRATIVE DESCRIPTION (continued)

Subsystem 3, Tanks D-1013, 1014, 1019, 1020, 1022, 1023, and 1024 (continued)

Tank D-1022 fill back to Glovebox MT-4 (HV-3169)
HV-3203 back to HV-3169 in Glovebox MT-4
(Drawing 09)

Tank D-1023 fill(HV-1906) back to D-1022 drain in Glovebox MT-4 (HV-3014) then D-1022 drain back to Glovebox MT-4 (HV-3014)
(Drawing 10)

Sample line from Tank D-1022 back to Glovebox MT-4 (HV-3042)
Sample line from Tank D-1023 back to Glovebox MT-4 (HV-3021)
Sample line from Tank D-1024 back to Glovebox MT-4 (HV-3028)
(Drawing 10)

Tank D-1024 fill (HV-1514) back to Glovebox MT-4 (HV-3268)
Glovebox MT-4 (HV-3282) back to Glovebox MT-4 (HV-3268)
Tank D-1024 drain back to Glovebox MT-3 (HV-3243)
Glovebox MT-7 (HV-4184) back to Glovebox MT-3 (HV-3243)
Tank D-1024 drain back to Glovebox MT-4 (HV-3043)
(Drawing 10)

Tank D-1082 (Room 174) back to Tank D-1023 Fill (HV-1907) Install a vent tap on D-1023 fill in the horizontal piping in the overhead between MT-4 and Tank D-1023
Tank D-1022 (HV-1511) fill back to Tank D-1023 drain
Waste to 774 transfer line back to Tank D-1023 drain (HV-1905) Install a vent tap before HV-1922
Waste to 774 transfer line back to Tank D-1014 drain (HV-1915) Install a vent tap before HV-1922
(Drawing 11)

Cycle the vacuum/vent valves for Tanks D-1019 and 1020
(Drawing 15)

Tank D-1019 fill back to Glovebox MT-4 (HV-3123)
Tank D-1020 fill back to Glovebox MT-4 (HV-3062)
D-1019 drain back to Glovebox MT-4 (HV-3176)
D-1020 drain back to Glovebox MT-4 (HV-3170)
(Drawing 14)

Subsystem 4, Tanks D-1009, 1010, 1011, 1012, 1032, 1064, 1066, and 1067

Tank D-1009 vacuum/vent line back to Glovebox MT-3 (HV-3192)
D-1009 fill (HV-1526) back to Glovebox MT-3 (HV-3191)
D-1009 drain back to Glovebox MT-3 (HV-3193)
(Drawing 16)

Tank D-1010 vacuum/vent line back to Glovebox MT-3 (HV-4174)
D-1010 fill (HV-1529) back to Glovebox MT-3 (HV-4175)
D-1010 drain back to Glovebox MT-3 (HV-4176)
(Drawing 16)

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K. NARRATIVE DESCRIPTION (continued)

Subsystem 4, Tanks D-1009, 1010, 1011, 1012, 1032, 1064, 1066, and 1067 (continued)

Tank D-1011 vacuum/vent line back to Glovebox MT-3 (HV-4181)
D-1011 fill (HV-1533) back to Glovebox MT-3 (HV-4182)
D-1011 drain back to Glovebox MT-3 (HV-4183)
(Drawing 17)

Tank D-1012 vacuum/vent line back to Glovebox MT-3 (HV-4178)
D-1012 fill (HV-1513) back to Glovebox MT-3 (HV-4179)
D-1012 drain back to Glovebox MT-3 (HV-4180)
(Drawing 17)

Tank D-1032 vac/vent line back to Glovebox MT-1 (HV-4118)
D-1032 dip tube sparge line back to Glovebox MT-1 (HV-4116)
D-1032 fill back to Glovebox MT-1 (HV-4117)
D-1032 drain back to Glovebox MT-1 (HV-3684)
(Drawing 18)

Tank D-1064 vacuum/vent line back to Glovebox MT-3
D-1064 fill back to Glovebox MT-3 (HV-3219)
D-1064 drain back to Glovebox MT-3 (HV-3186)
(Drawing 19)

Tank D-1066 vac/vent line back to Glovebox MT-1
D-1066 fill back to Glovebox MT-3 (HV-3206)
D-1066 drain back to Glovebox MT-3 (HV-3368)
(Drawing 19)

Scrubber Tank D-1067 back to Glovebox MT-3 (HV-3210, HV-3245, and HV-3246)
(Drawing 19)

Subsystem 5, Glovebox MT-1, MT-2, MT-3, and MT-4 Glovebox to Glovebox Piping

Glovebox MT-3 (HV-3217) back to Glovebox MT-2 (HV-4201)
Glovebox MT-1 back to Glovebox MT-2 (HV-4201)
Glovebox MT-4 (HV-3157) back to Glovebox MT-2 (HV-4201)
Glovebox MT-4 (HV-3567) back to Glovebox MT-2 (HV-4201)
Glovebox MT-2 (HV-4202) back to Glovebox MT-2 (HV-4201)
Glovebox MT-2 back to Glovebox MT-2 (HV-4201)
(Drawing 20)

Glovebox MT-3 back to Glovebox MT-2 (HV-4206)
Glovebox MT-1 back to Glovebox MT-2 (HV-4206)
Glovebox MT-4 (HV-3290) back to Glovebox MT-2 (HV-4206)
Glovebox MT-2 (HV-4205) back to Glovebox MT-2 (HV-4206)
Glovebox MT-2 (HV-2797) back to Glovebox MT-2 (HV-4206)
(Drawing 21)

Glovebox MT-4 North Transfer (HV-3154) back to Glovebox MT-4 (HV-3017)
Glovebox MT-4 Center Transfer (HV-3142) back to Glovebox MT-4 (HV-3030)
(Drawing 22)

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K. NARRATIVE DESCRIPTION (continued)

Subsystem 5, Glovebox MT-1, MT-2, MT-3, and MT-4 Glovebox to Glovebox Piping (continued)

Glovebox MT-3 Transfer #3 back to Glovebox MT-1 (HV-4140)
Glovebox MT-1 (2 additional drain points) back to Glovebox MT-1 (HV-4140)
(Drawing 23)

Glovebox MT-3 Transfer #4 back to Glovebox MT-2 (HV-4142)
Glovebox MT-2 back to Glovebox MT-2 (HV-4142)
Glovebox MT-2 (HV-4141) back to Glovebox MT-2 (HV-4142)
(Drawing 24)

Subsystem 6, Solvent Extraction (TBP/Dodecane)

Tank D-1062 vacuum/vent line back to Glovebox MT-7
D-1062 fill back to MT-7 (HV-4111)
D-1062 drain back to Mt-7 (HV-2165)
(Drawing 25)

Tank D-1063 vacuum/vent line (HV-4112) back to Glovebox MT-7
D-1063 fill back to MT-7 (HV-4113)
D-1063 drain back to Mt-7 (HV-2163)
(Drawing 25)

Strip Solution Column vacuum/vent line back to Glovebox MT-7
Strip Solution Column fill back to MT-7 (HV-4114)
Strip Solution Column drain back to Mt-7 (HV-4115)
(Drawing 25)

Glovebox MT-4 (HV-3294) back to Glovebox MT-3 (HV-3207)
Glovebox MT-7 Solvent Extraction Vessel fills (HV-4200, HV-4207, HV-4208, and HV-4209 back to Glovebox MT-7.
Glovebox MT-7 Solvent Extraction Vessel drain (HV-4203) back to Glovebox MT-4 (HV-3272)
(Drawing 26)

Modify piping as required to Tanks D-1015, 1016, 1017, and 1018 within Glovebox MT-7 to accommodate the draining of the glovebox internal piping. Drain internal glovebox piping from top to bottom using process knowledge and lessons learned from draining System 3, TBP/Dodecane (Room 181A). (Pick any glovebox to run Tygon hose from, but can't put an Ejector pump in MT-7, as there is only one glovebox exhaust filter)
(Drawing 26A)

Tank D-1065 vacuum/vent line back to Glovebox MT-4
D-1065 fill back to Glovebox MT-4 (HV-4110)
D-1065 drain back to Glovebox MT-4 (HV-3183)
(Drawing 27)

25 27

Attachment 1, cont.: Initial Characterization for System #9

L. PIPING REMOVAL DESCRIPTION

Piping removal should follow the subsystem method all subsystems as described in the Engineering Design Package, with additional details for Subsystems 2, 3, and 6.

Subsystem 2:

D-1007 drain line is imbedded in the concrete floor. The line should be drained, cut above floor level on both ends, residual liquids drained by straw and siphon type method if possible, open pipe ends contained and tagged to identify that the pipe that remains contained Pu/U/Np nitrate solution.

Subsystem 3:

Remove the fill line from D-1023 from Room 146, D-1084 above tank D-1023. The remainder of piping will be removed as part of System 10, U Recovery, Room 174.

Remove Tank D-1023 drain back to HV-1922.

The drain line from Tank D-1014 (Waste to 774) will be left in tact, and removed as part of System 34, Acid Waste Lines. Tank D-1014 drain back to Glovebox MT-4 will be removed at HV-1916, leaving the Waste to 774 piping in place.

Subsystem 6:

Remove and store the piping from this subsystem separately from the remaining subsystems as to take into consideration the TBP/dodecane two phased liquid issues, until such time that chemical compatibility can be verified.

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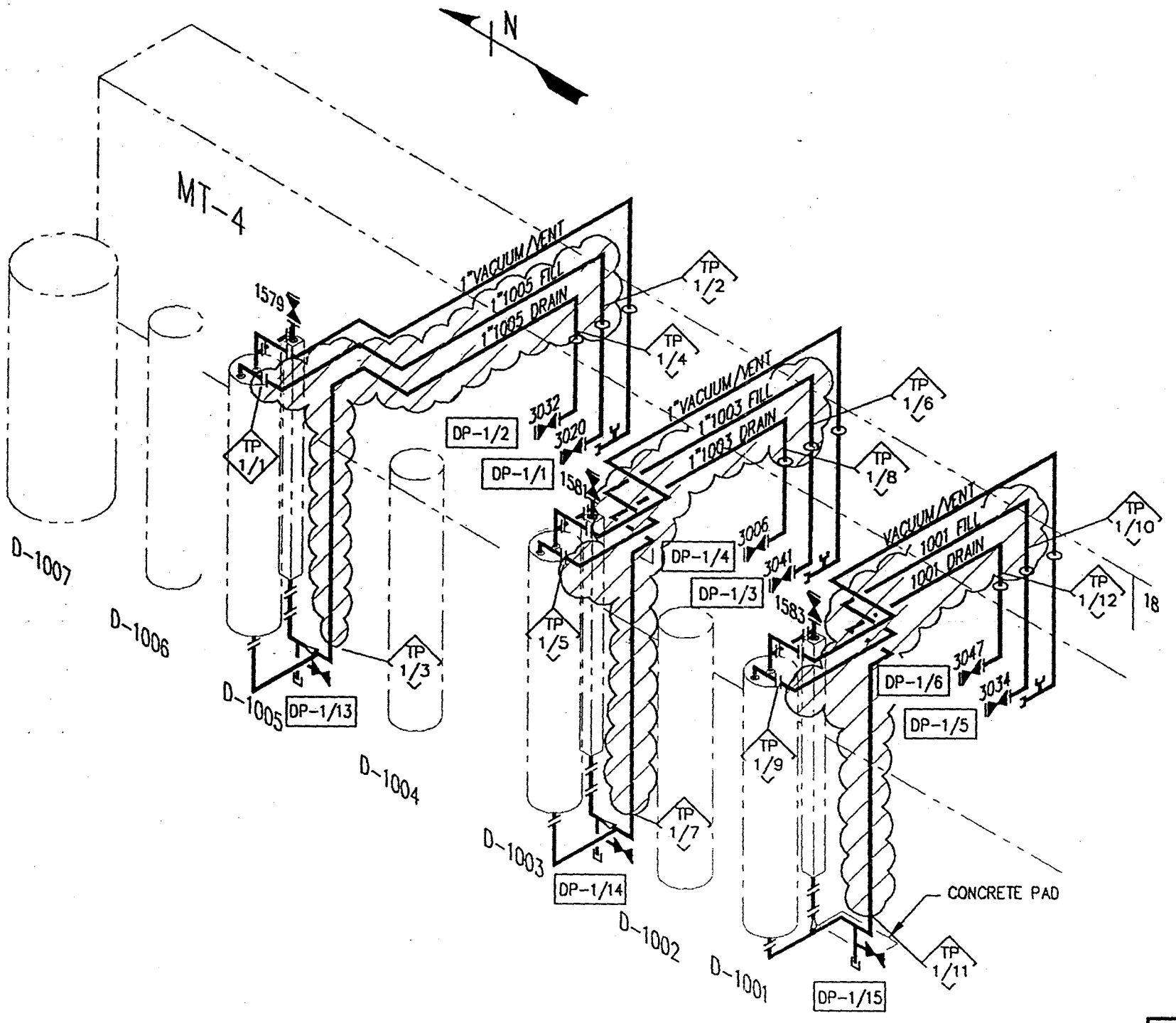
Figure 1: System #9 – Subsystem #1



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 1

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO	J.C. Faull	T0100394-X001

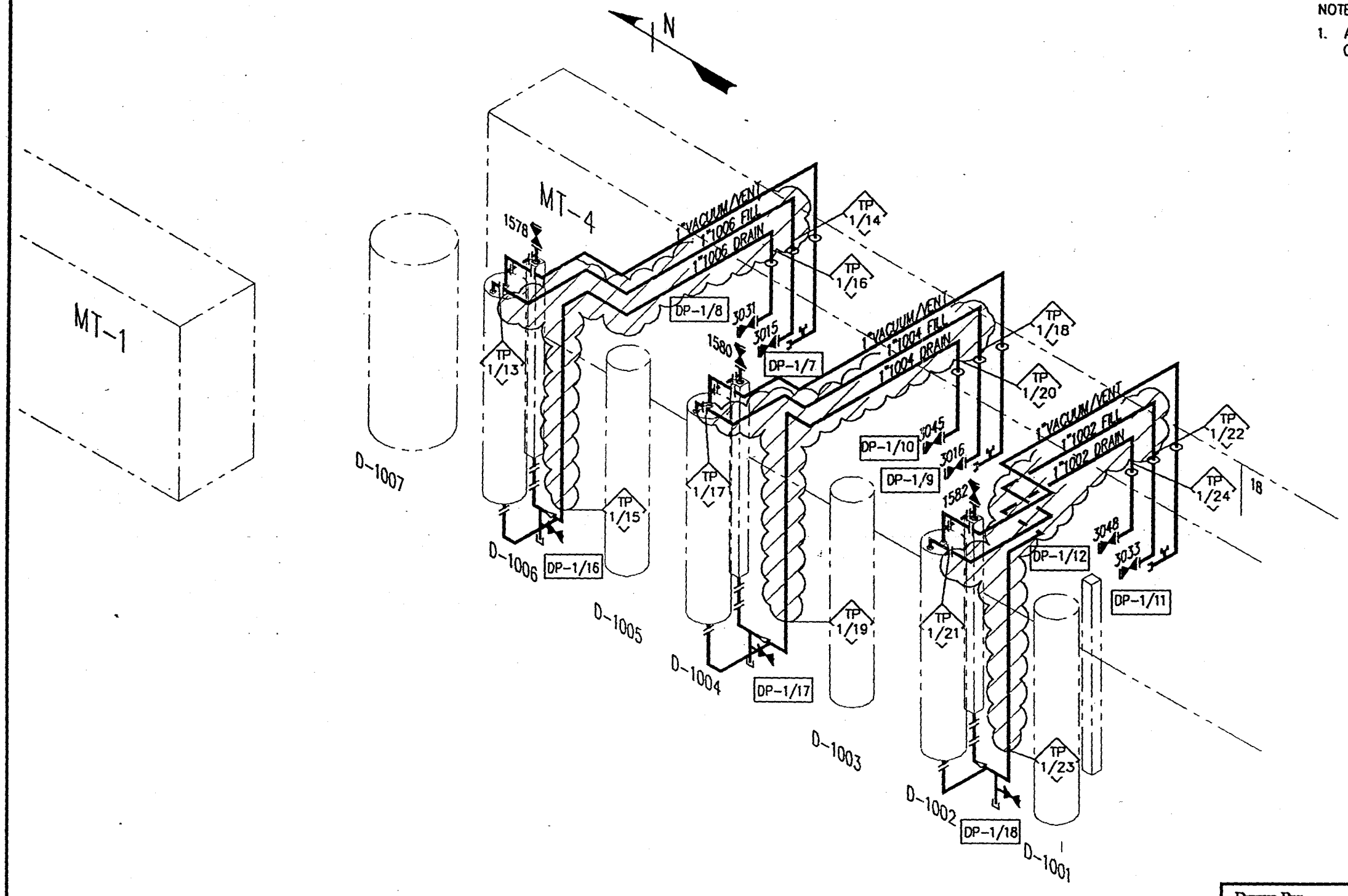
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 2: System #9– Subsystem #1



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 1

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X002

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

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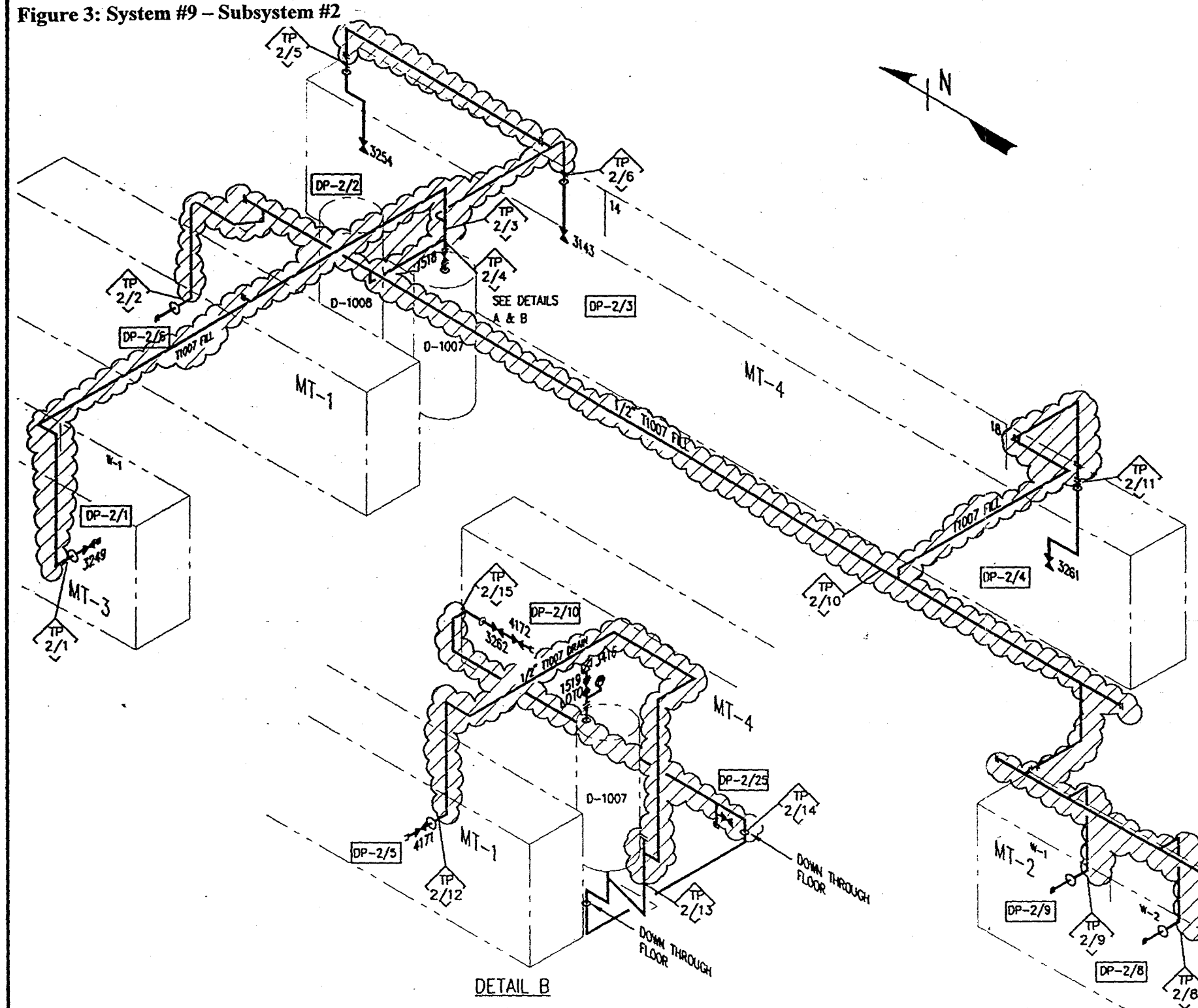
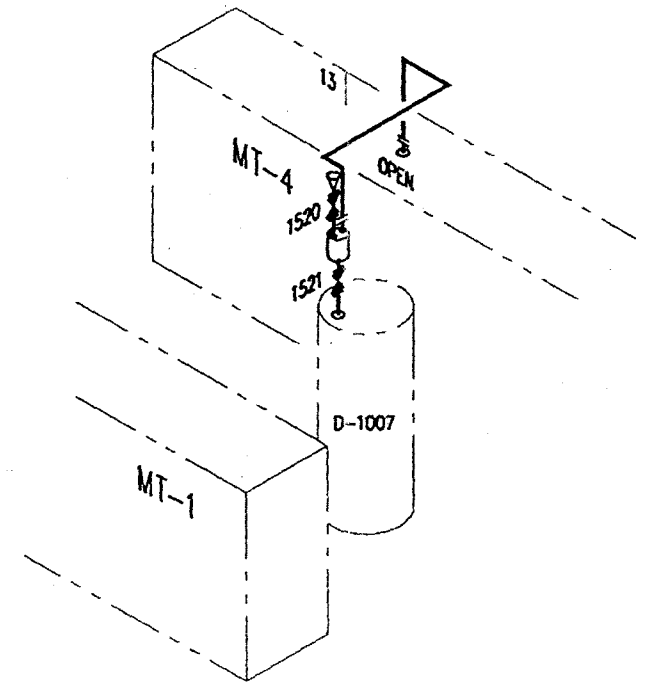
Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 3: System #9 – Subsystem #2



DETAIL B



DETAIL A

NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 2

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X003

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

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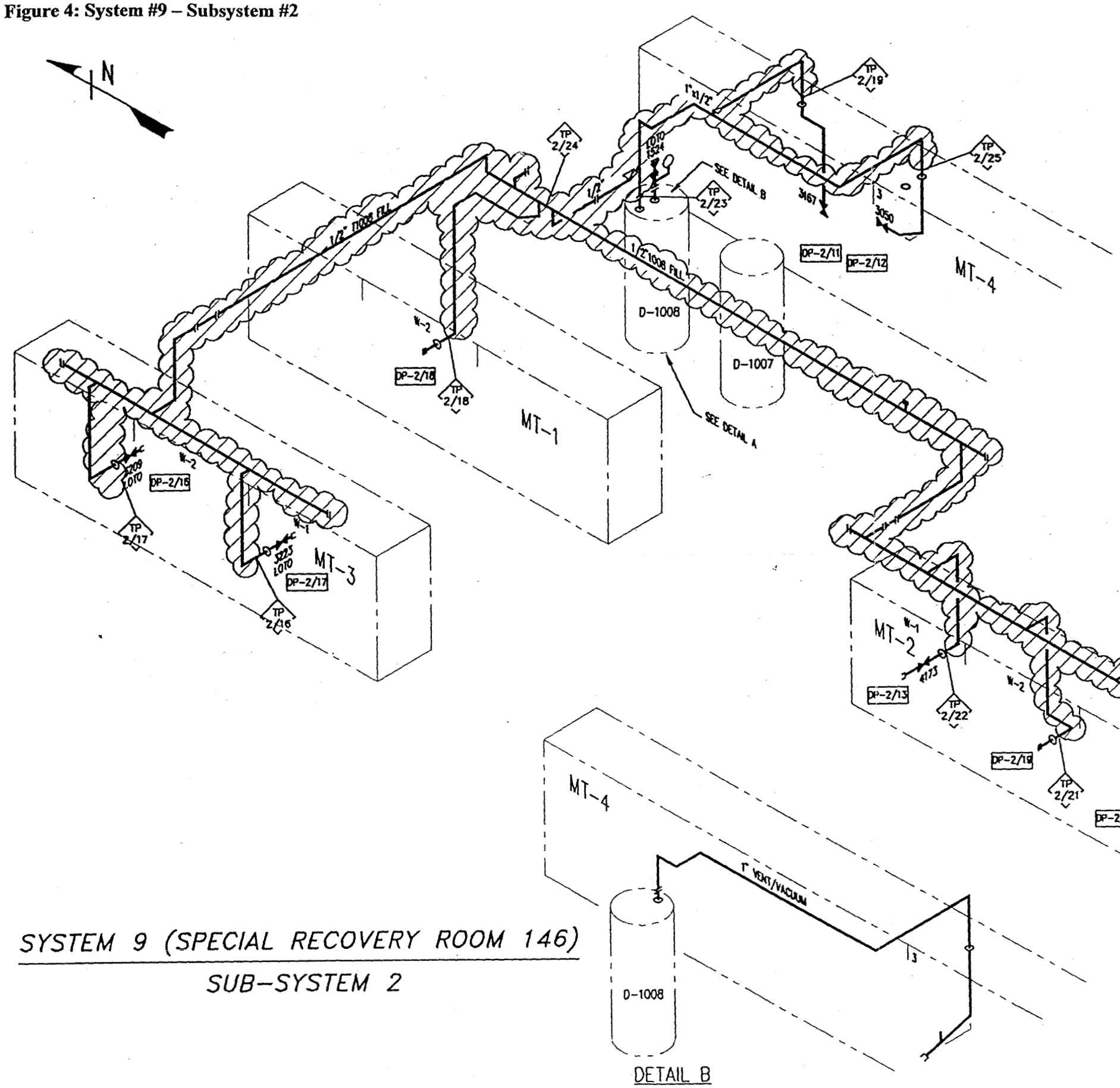
Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 4: System #9 – Subsystem #2



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

D-1008: ELUATE HOLDING TANK FOR SHIPMENT TO ROOM 114

DETAIL B

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 2

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X005

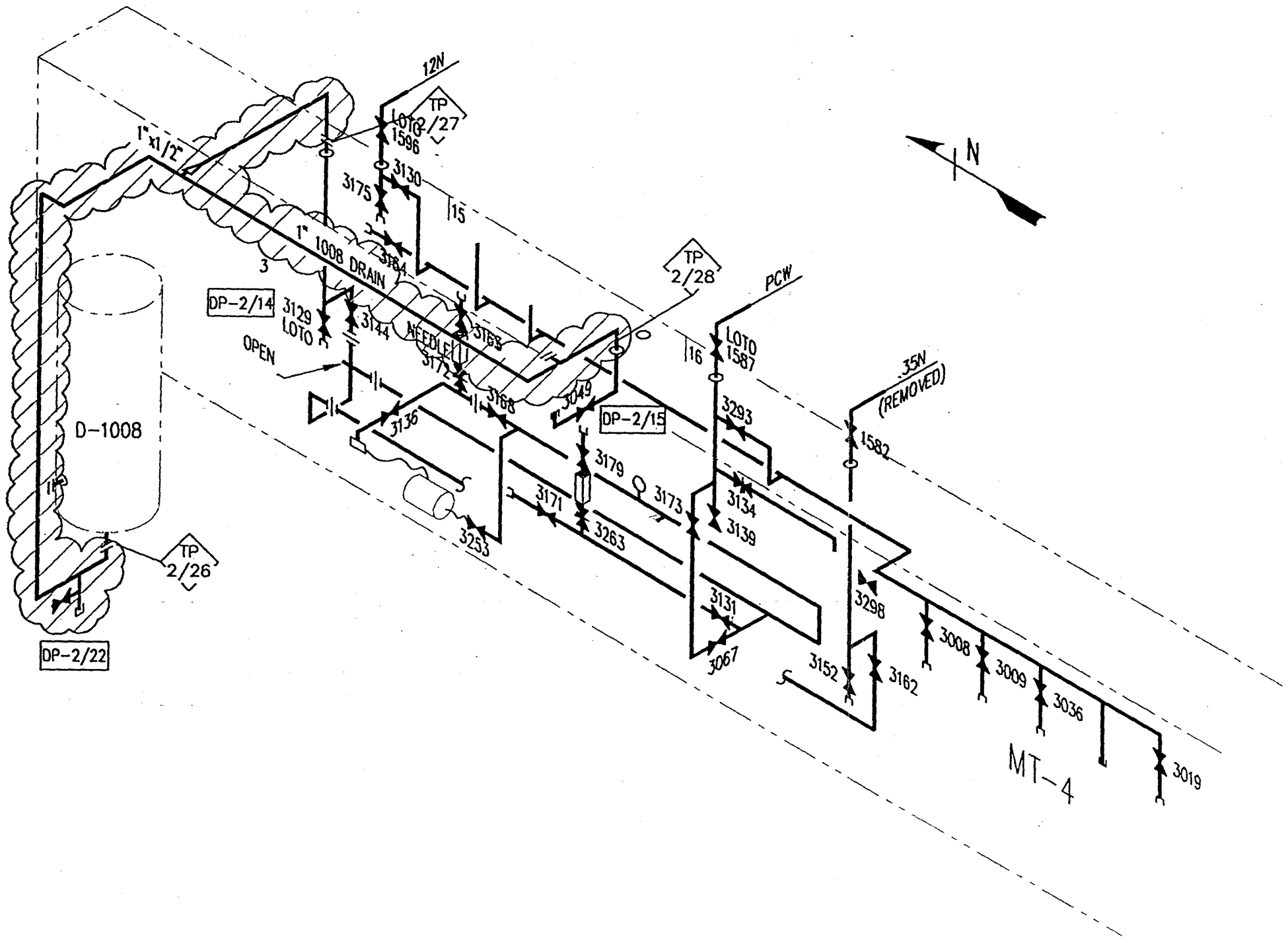
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 5: System #9– Subsystem #2



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED. ALL VALVES ARE FLANGED.

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 2

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X006

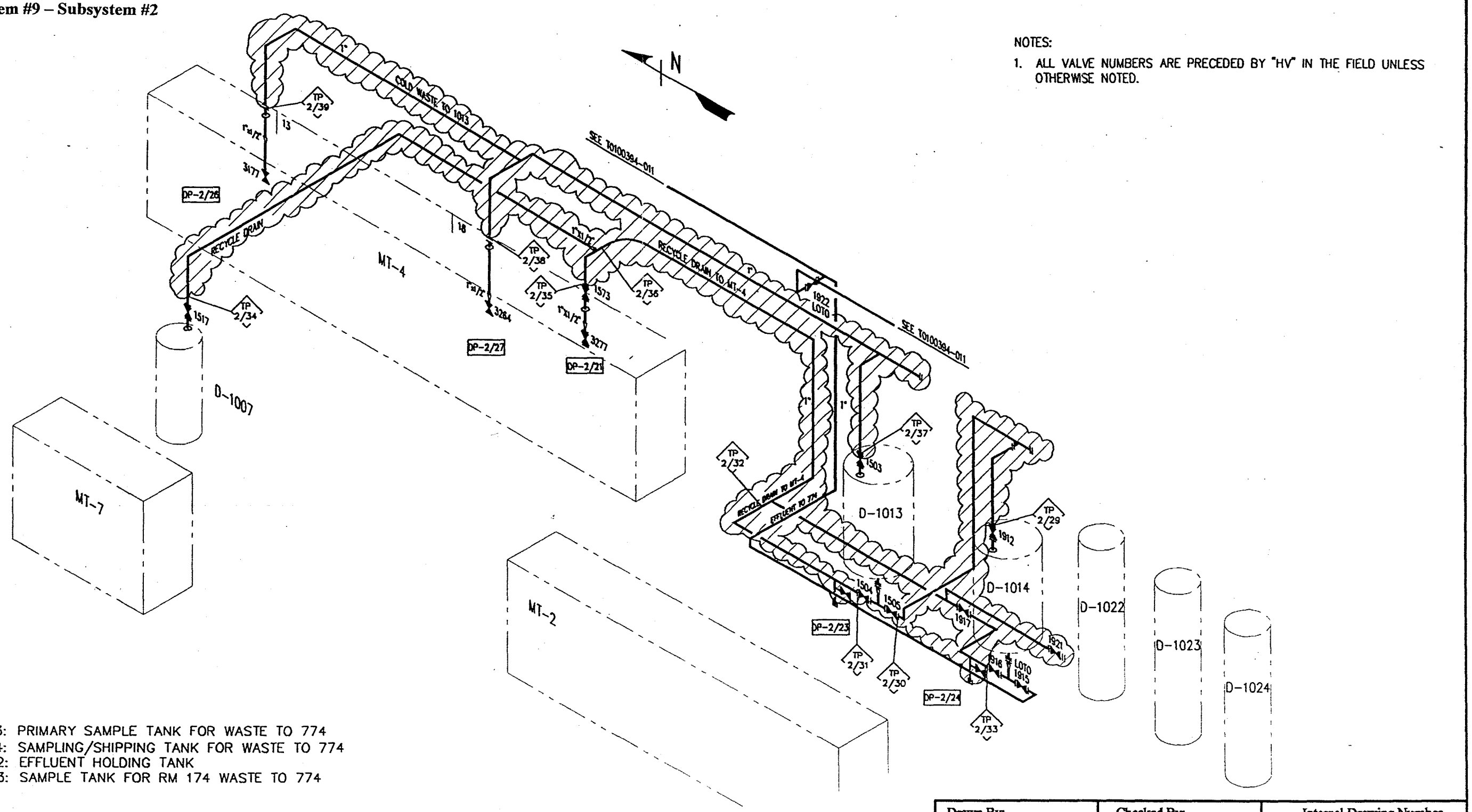
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 6: System #9 – Subsystem #2



D–1013: PRIMARY SAMPLE TANK FOR WASTE TO 774
D–1014: SAMPLING/SHIPPING TANK FOR WASTE TO 774
D–1022: EFFLUENT HOLDING TANK
D–1023: SAMPLE TANK FOR RM 174 WASTE TO 774

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB–SYSTEM 2

SYMBOLS

DP–## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394–X007

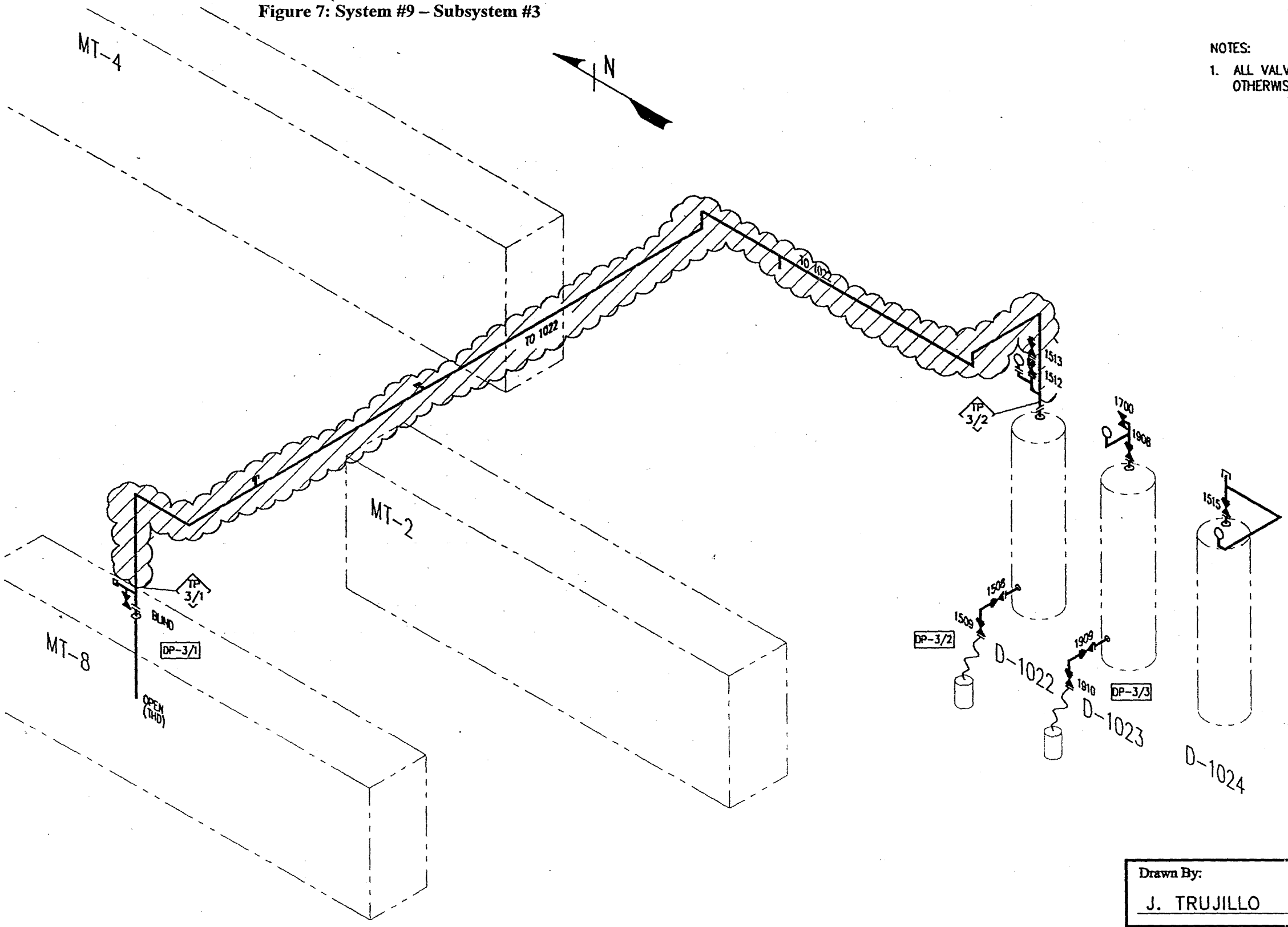
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163–7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 7: System #9 – Subsystem #3



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 3

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X008

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

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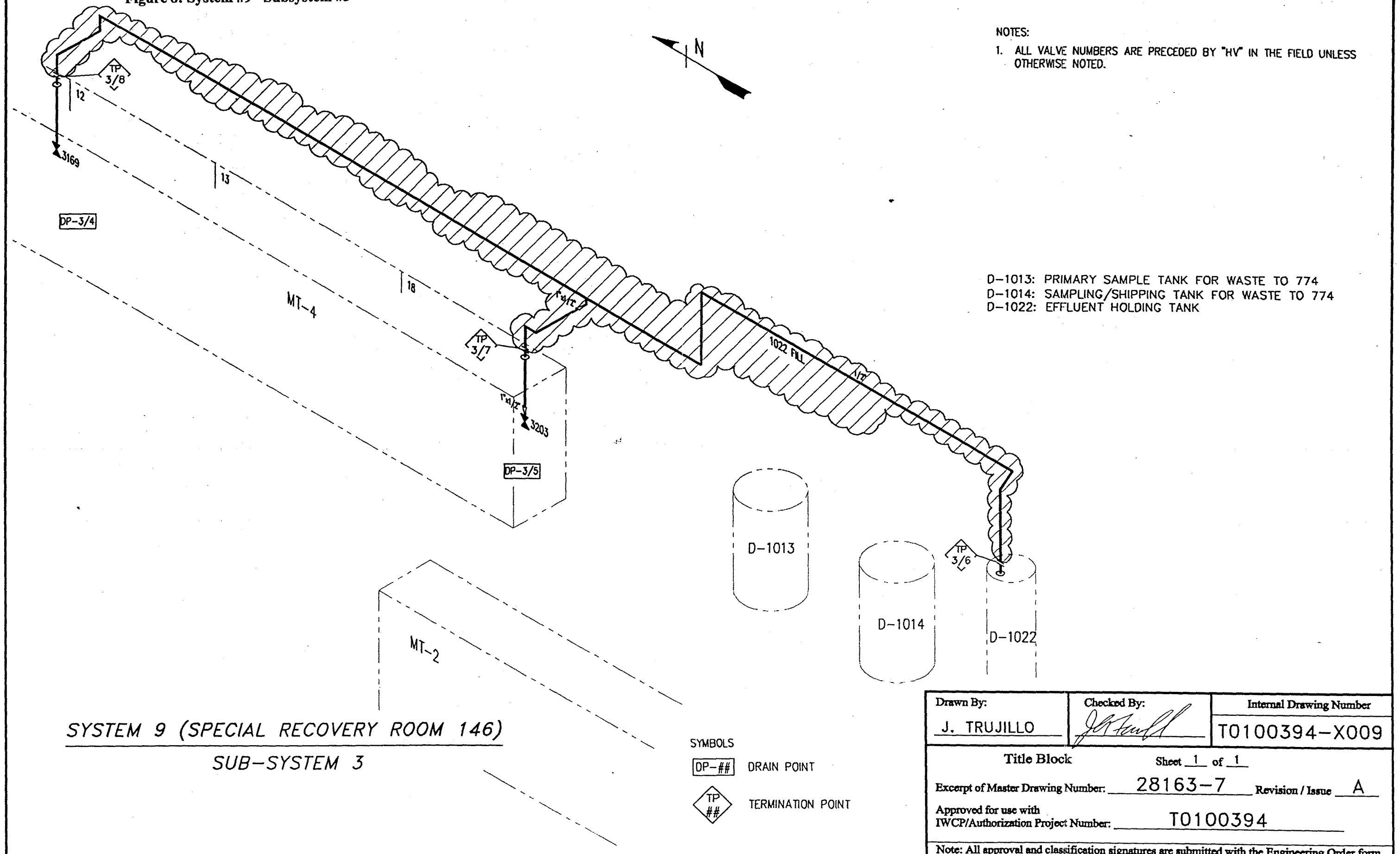
Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 8: System #9– Subsystem #3



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

D-1013: PRIMARY SAMPLE TANK FOR WASTE TO 774
D-1014: SAMPLING/SHIPPING TANK FOR WASTE TO 774
D-1022: EFFLUENT HOLDING TANK

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 3

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X009

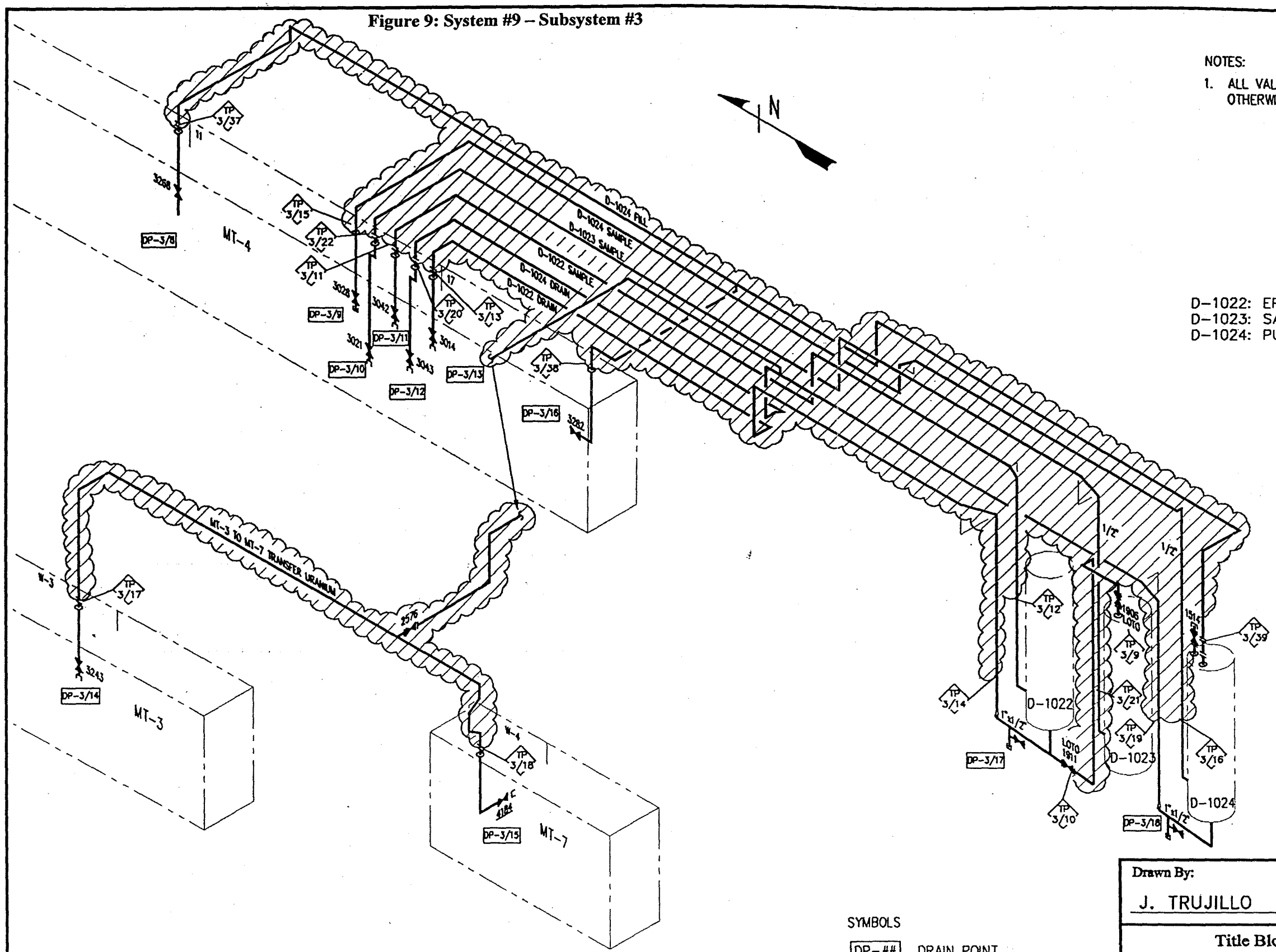
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 9: System #9 – Subsystem #3



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

D–1022: EFFLUENT HOLDING TANK
D–1023: SAMPLE TANK FOR RM 174 WASTE TO 774
D–1024: PU ELUATE HOLDING TANK

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB–SYSTEM 3

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394–X010

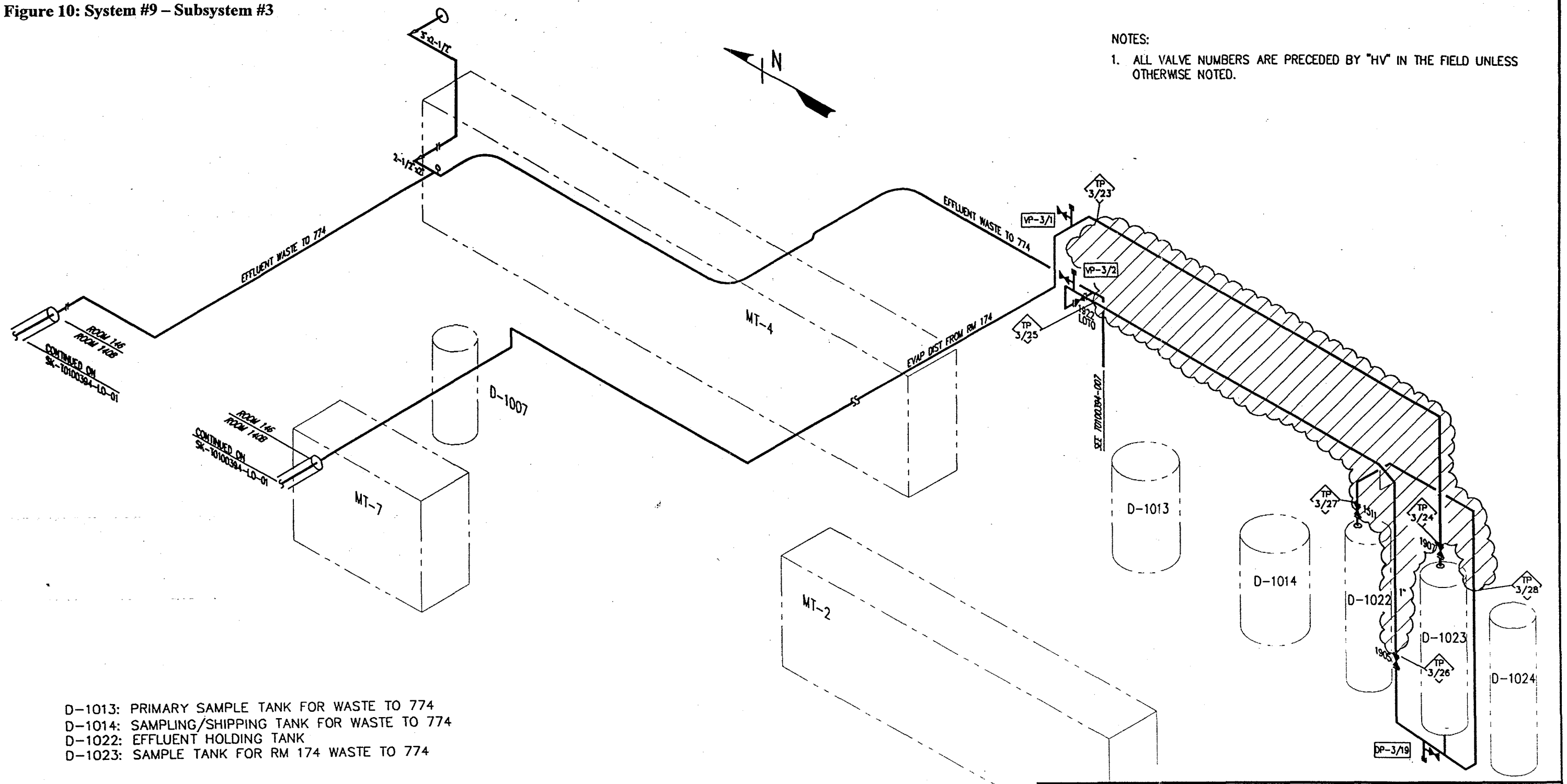
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163–7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 10: System #9 – Subsystem #3



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

D-1013: PRIMARY SAMPLE TANK FOR WASTE TO 774
D-1014: SAMPLING/SHIPPING TANK FOR WASTE TO 774
D-1022: EFFLUENT HOLDING TANK
D-1023: SAMPLE TANK FOR RM 174 WASTE TO 774

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 3

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X011

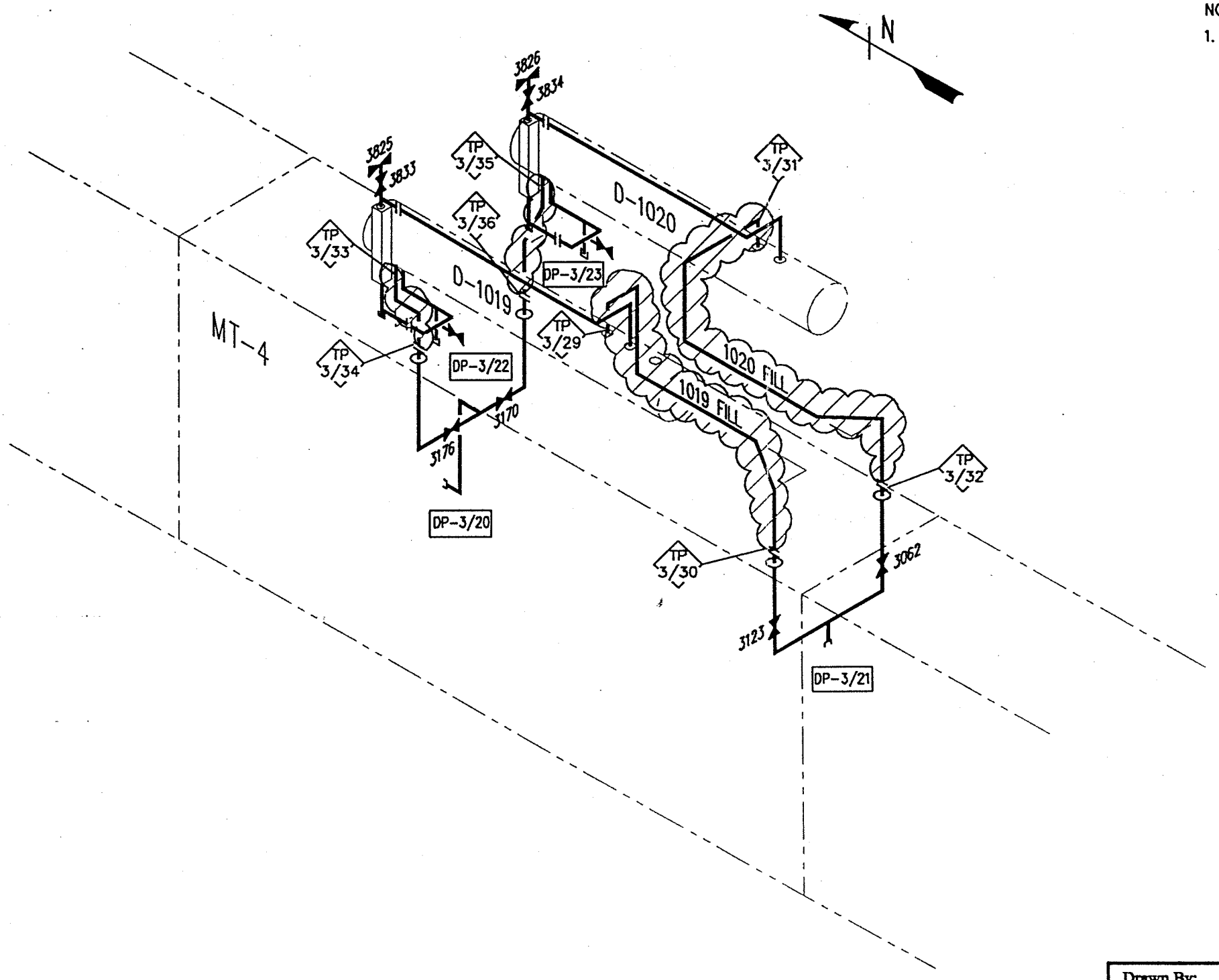
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 11: System #9– Subsystem #3



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 3

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X014

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

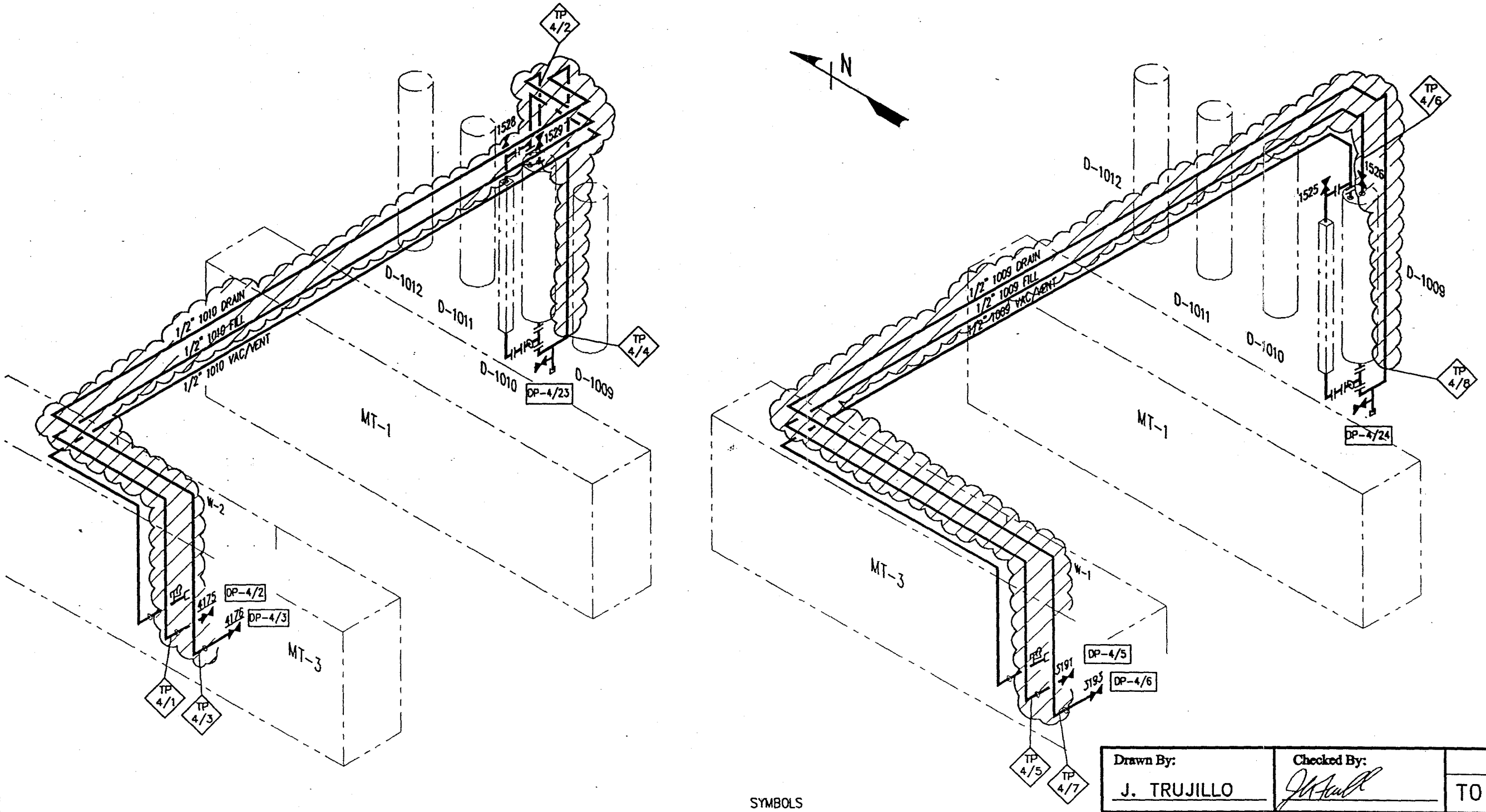
Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 12: System #9 – Subsystem #4

NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.



SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 4

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X016

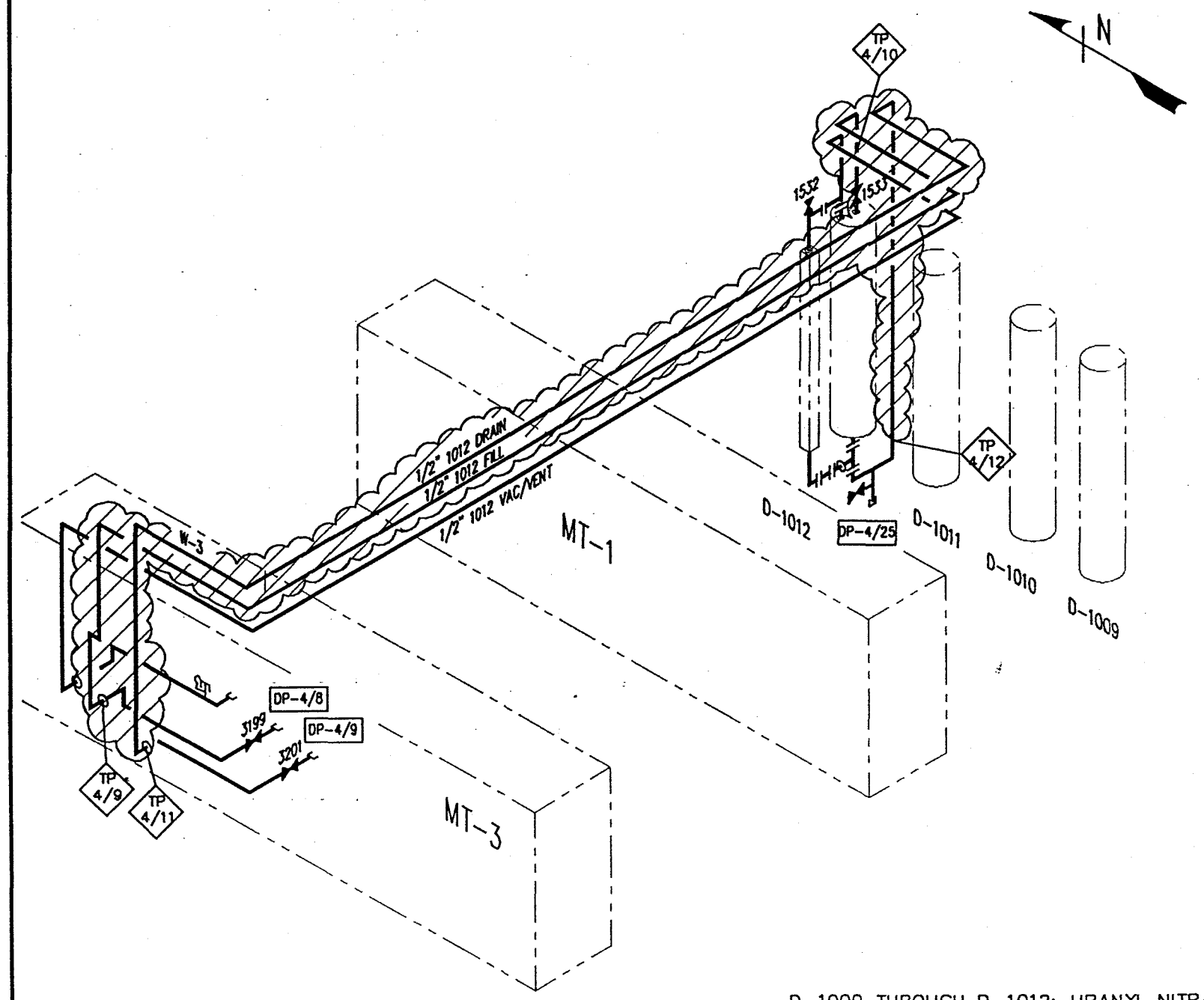
Title Block Sheet 1 of 1

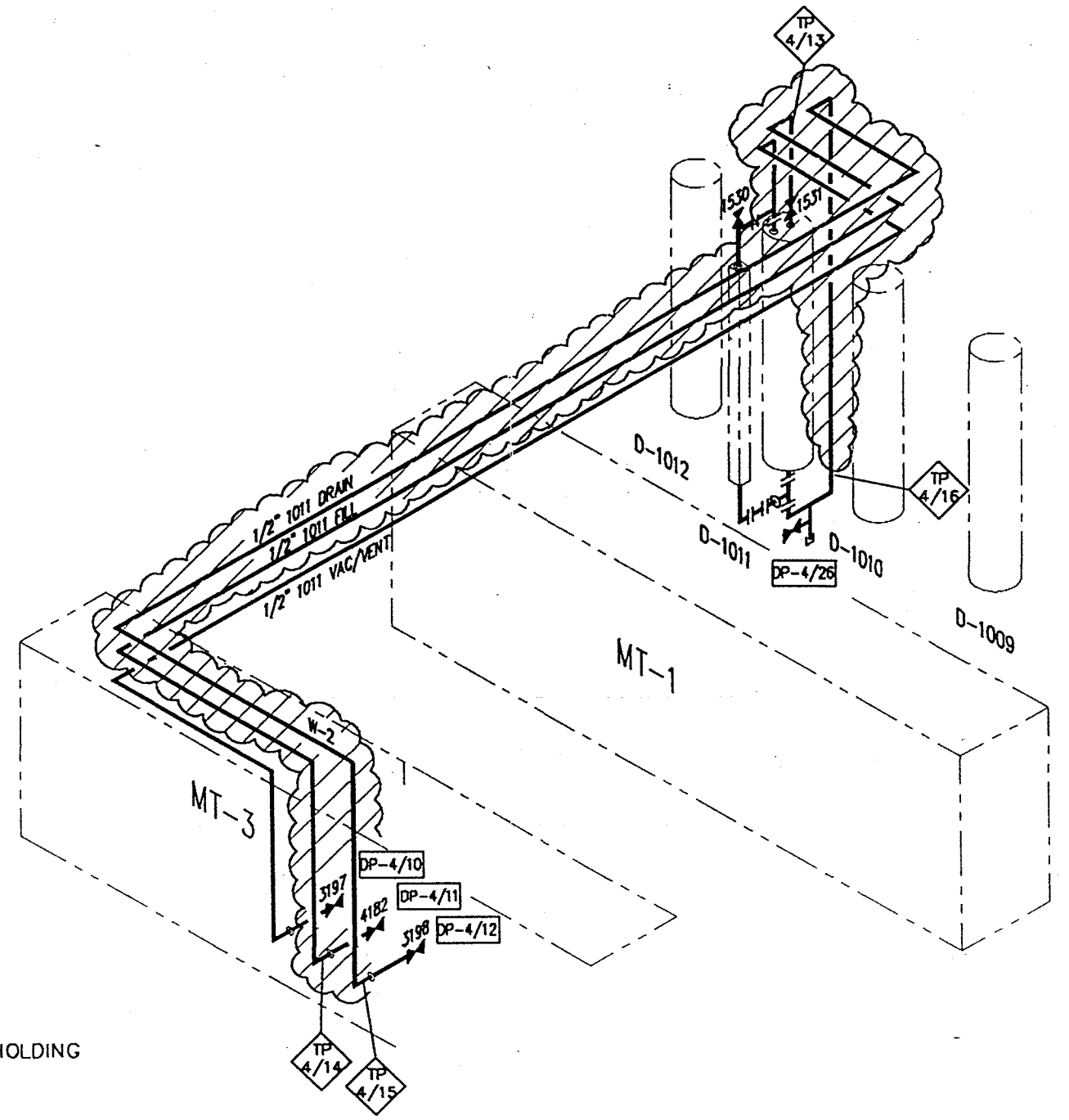
Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 13: System #9 – Subsystem #4





NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

D-1009 THROUGH D-1012: URANYL NITRATE HOLDING TANKS FROM ROOM 174

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 4

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X017

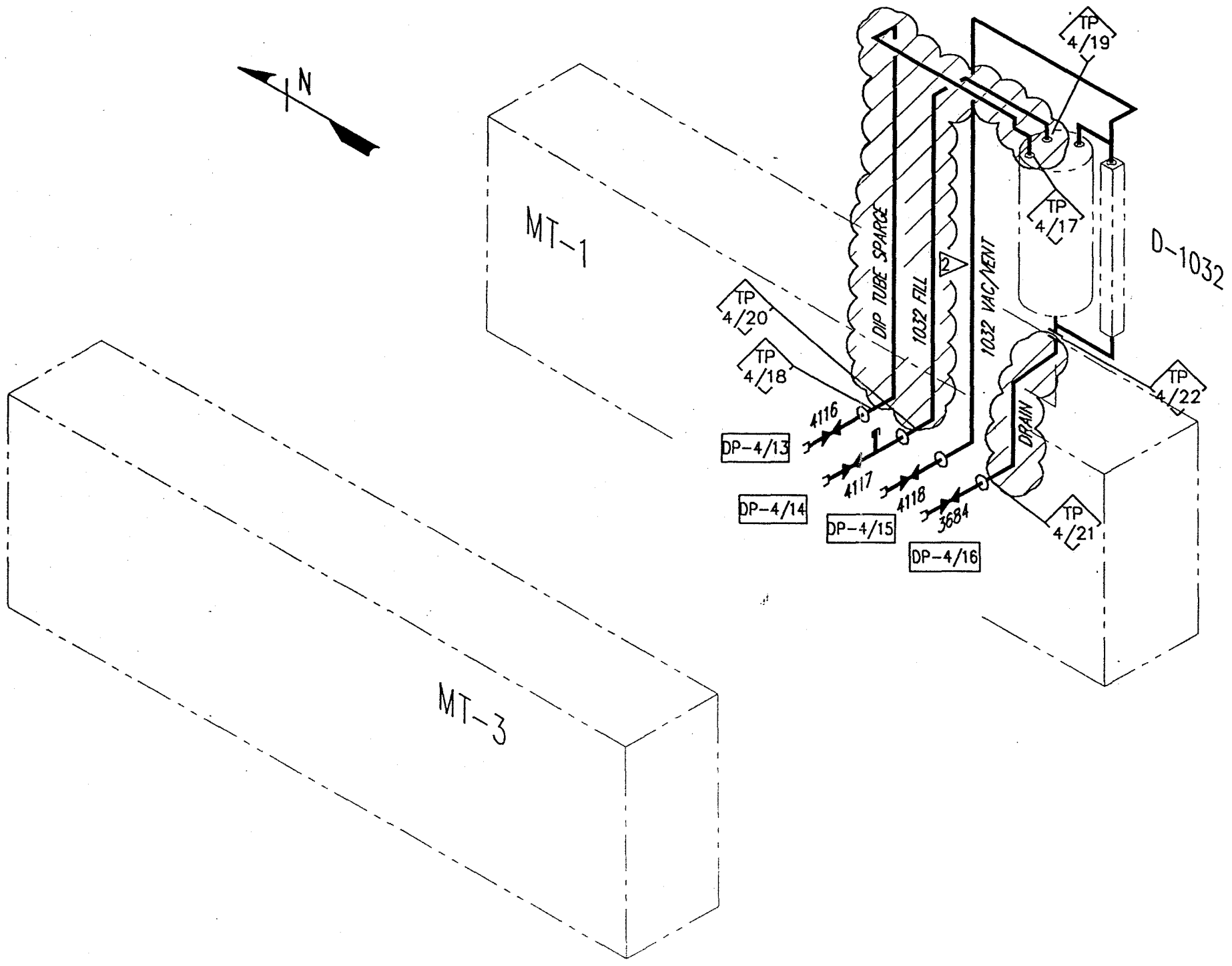
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 14: System #9– Subsystem #4



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.
2. ▷ PIPING MISLABELED IN THE FIELD. LABELING SHOWN ON DRAWING IS NOT CORRECT.

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 4

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X018

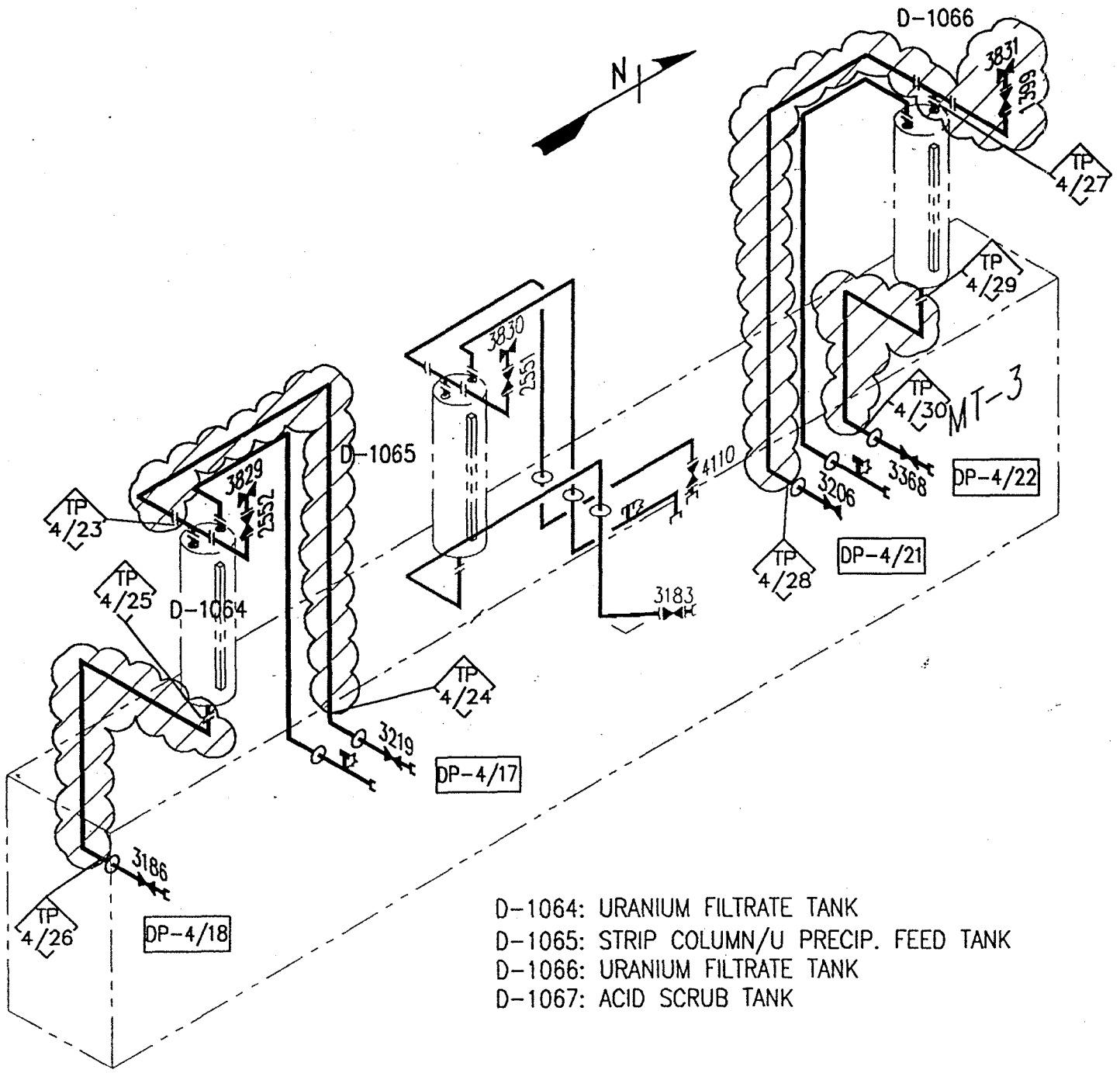
Title Block Sheet 1 of 1

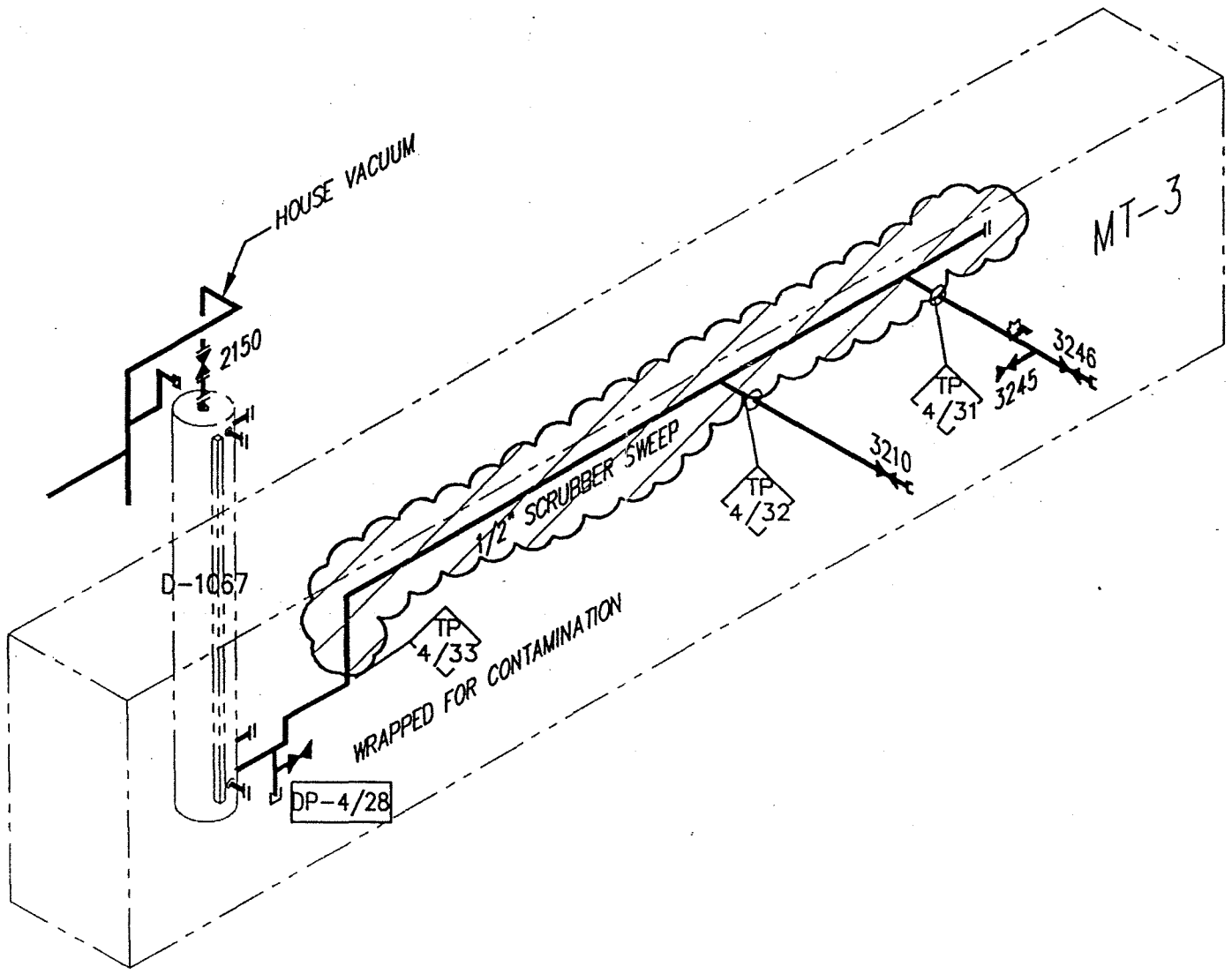
Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 15: System #9 – Subsystem #4





NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

D-1064: URANIUM FILTRATE TANK
D-1065: STRIP COLUMN/U PRECIP. FEED TANK
D-1066: URANIUM FILTRATE TANK
D-1067: ACID SCRUB TANK

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 4

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X019

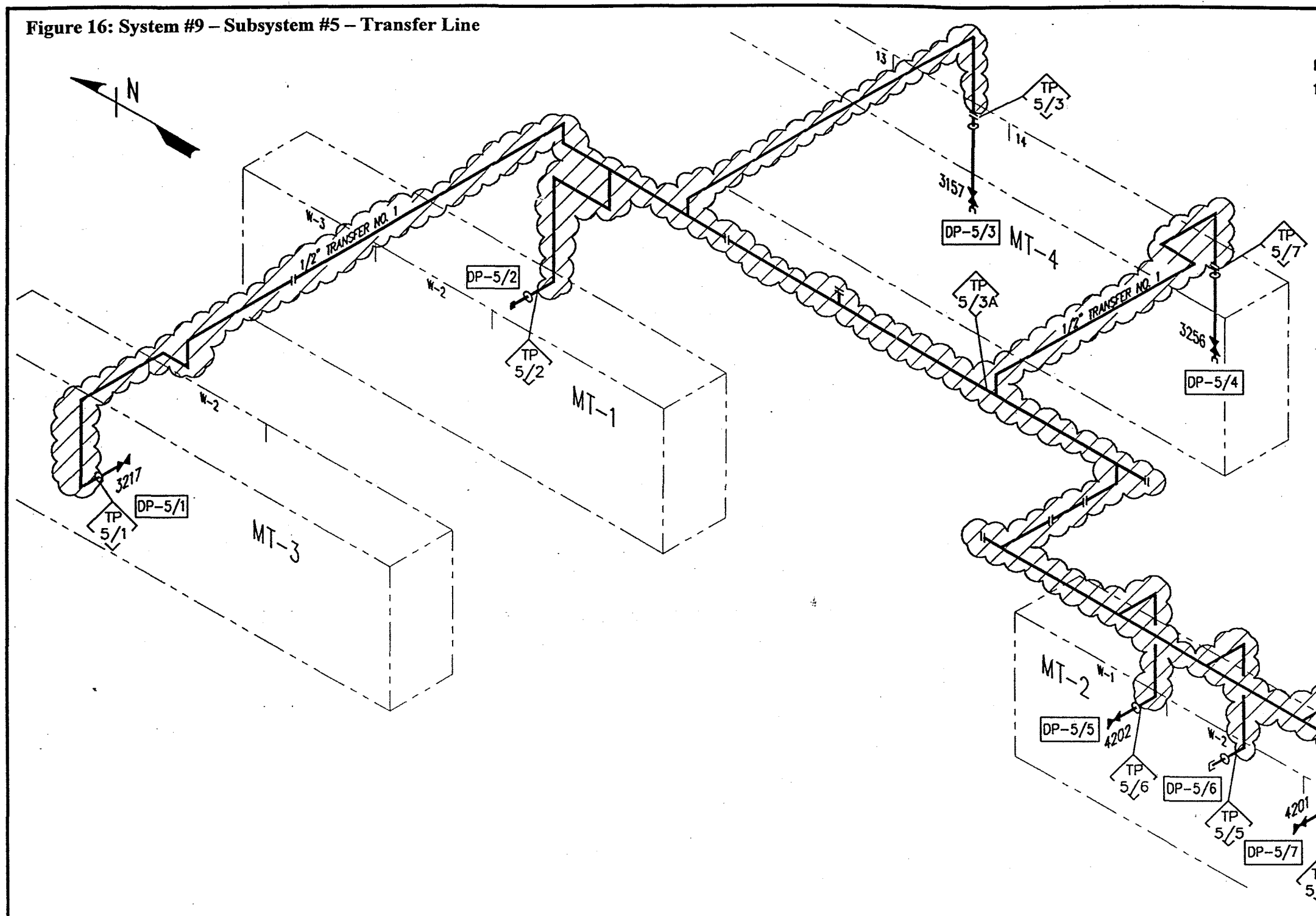
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 16: System #9 – Subsystem #5 – Transfer Line



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 5
TRANSFER LINE

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X020

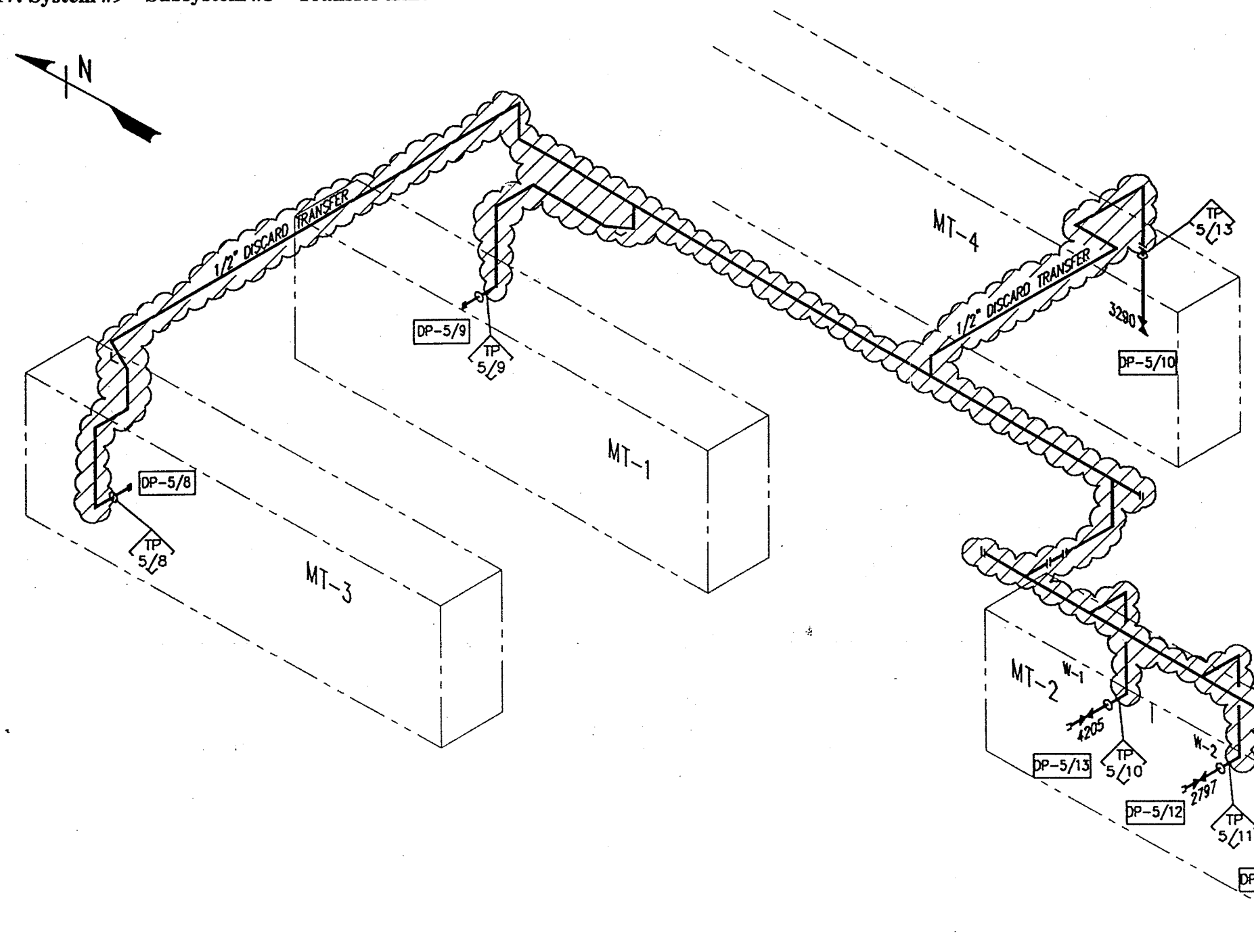
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 17: System #9 – Subsystem #5 – Transfer Line



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 5
TRANSFER LINE

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X021

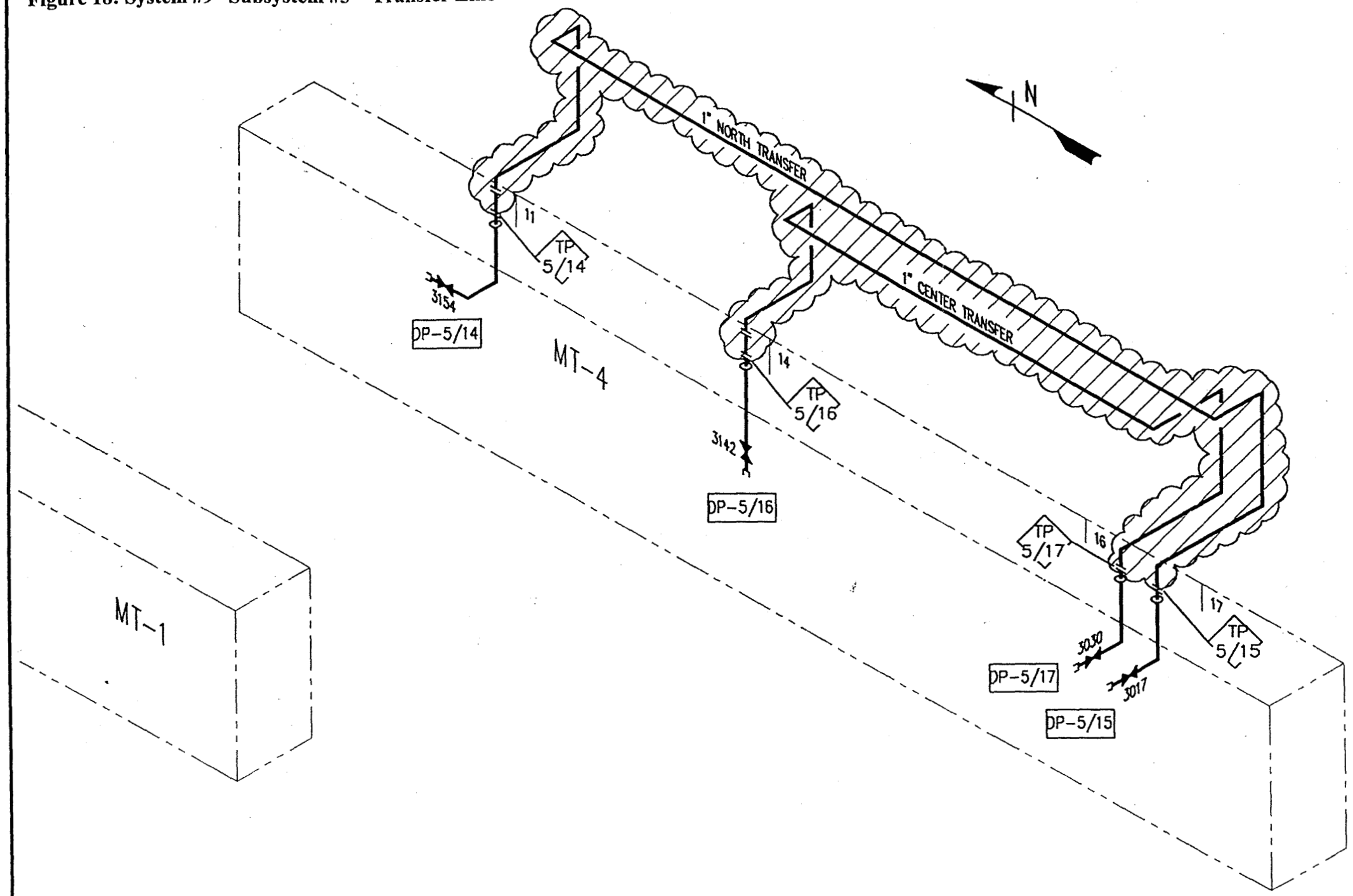
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 18: System #9– Subsystem #5 – Transfer Line



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 5
TRANSFER LINE

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X022

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

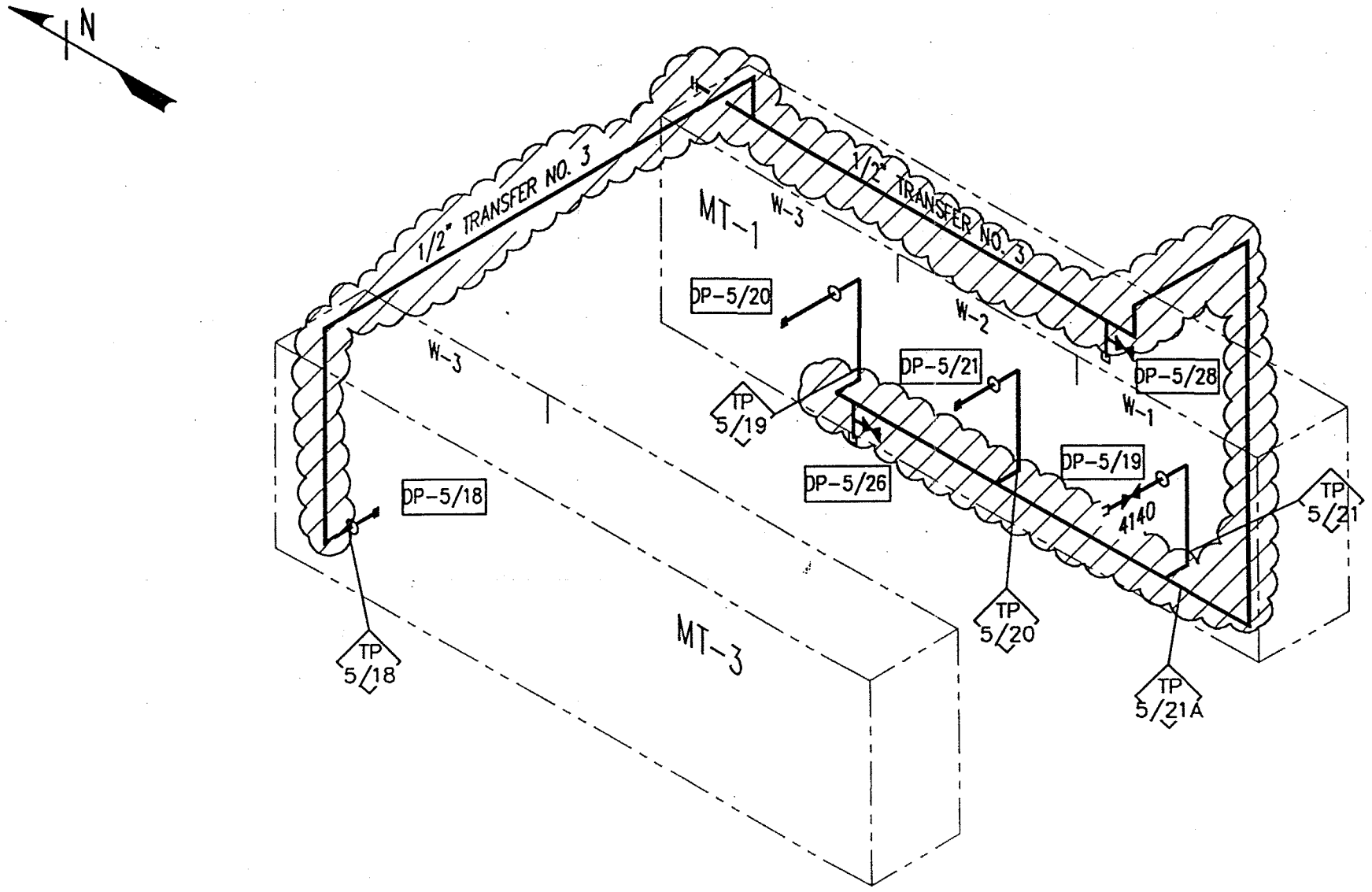
Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 19: System #9 – Subsystem #5 – Transfer Line

NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.



SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 5
TRANSFER LINE

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X023

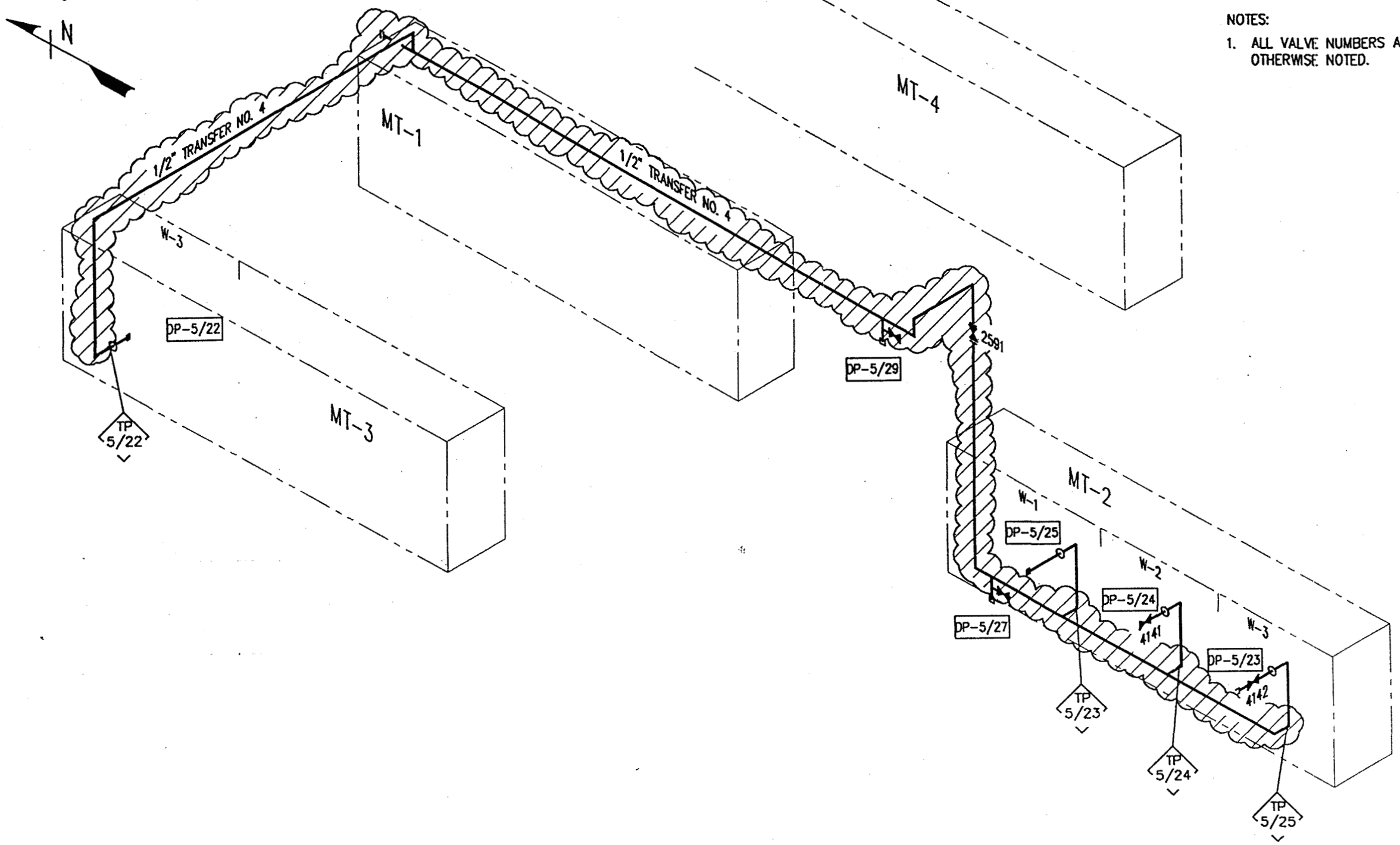
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 20: System #9 – Subsystem #5 – Transfer Line



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 5
TRANSFER LINE

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X024

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

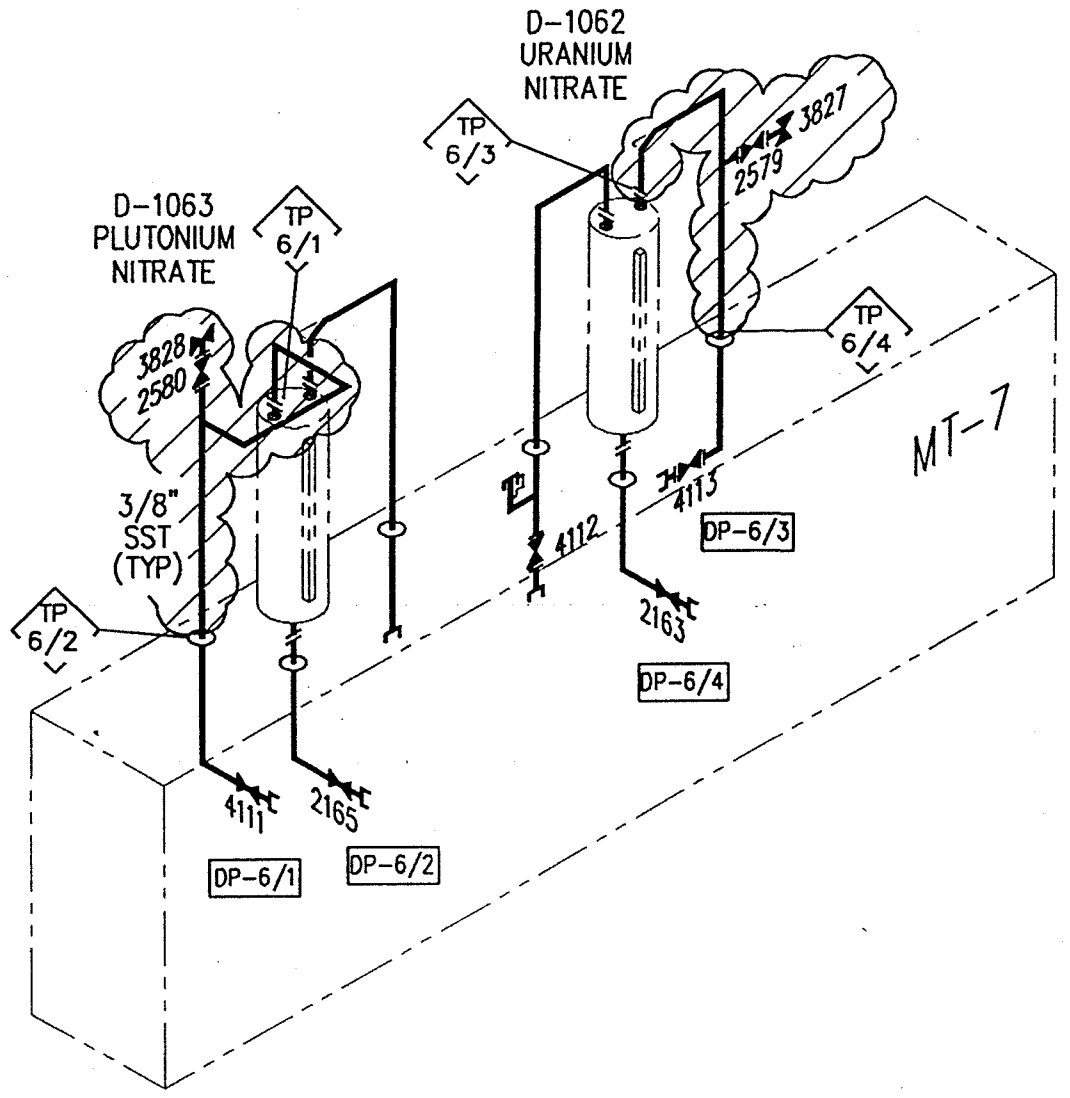
Approved for use with IWCP/Authorization Project Number: T0100394

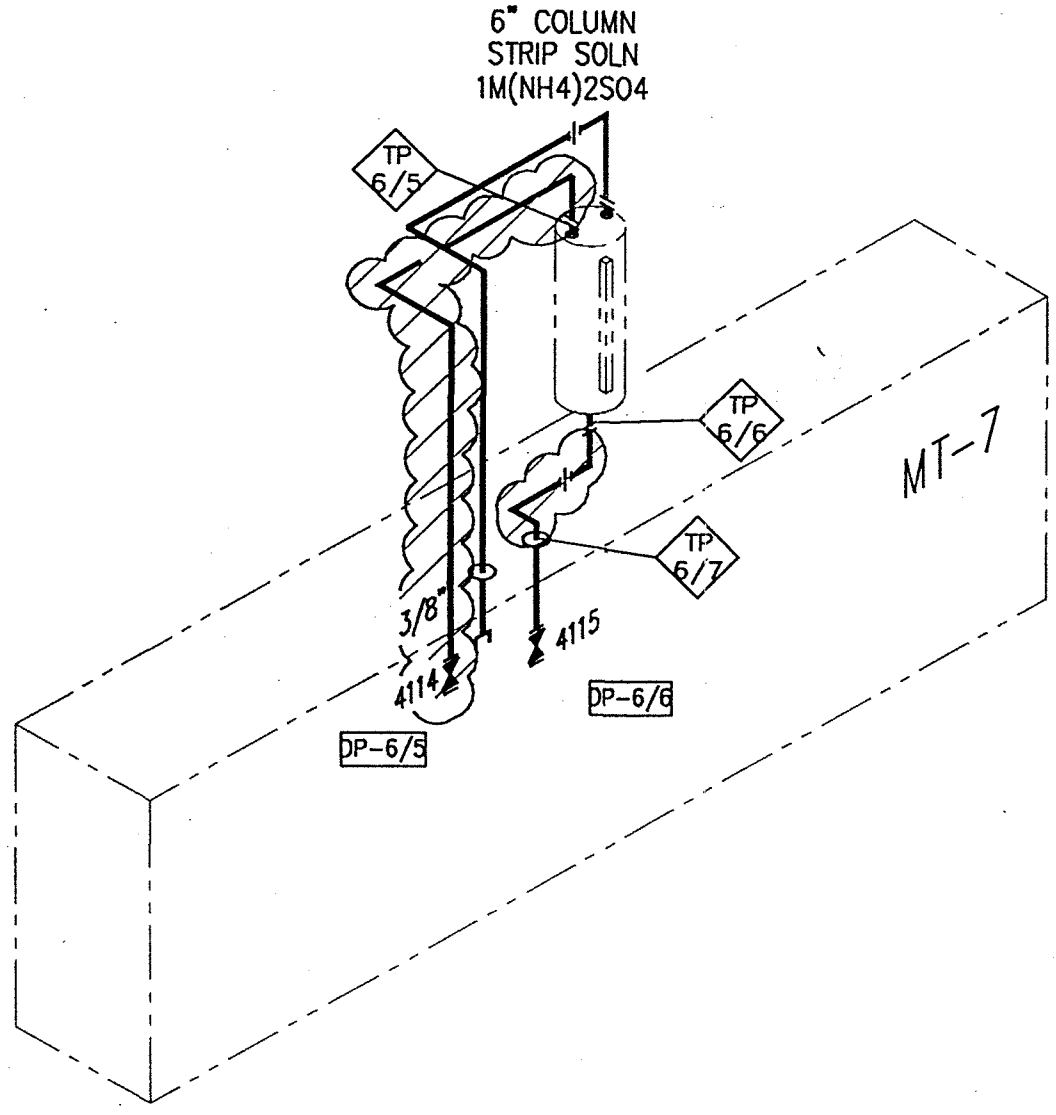
Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 21: System #9– Subsystem #6

NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.





T–1062: URANYL NITRATE HOLDING TANK
T–1063: PLUTONIUM NITRATE HOLDING TANK

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB–SYSTEM 6

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394–X025

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163–7 Revision / Issue A

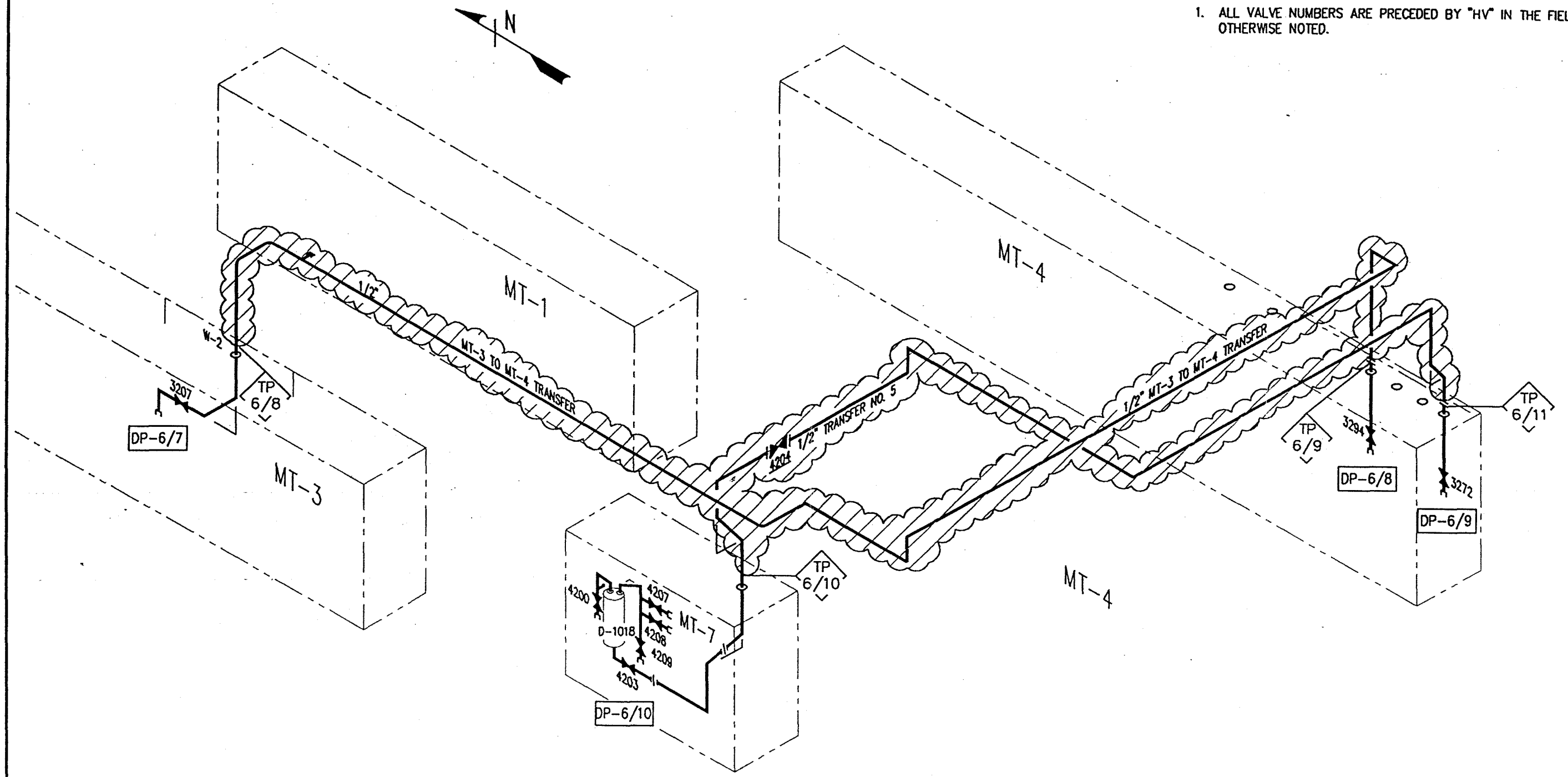
Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 22: System #9 – Subsystem #6 – Transfer Line

NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.



SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB–SYSTEM 6
TRANSFER LINE

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394–X026

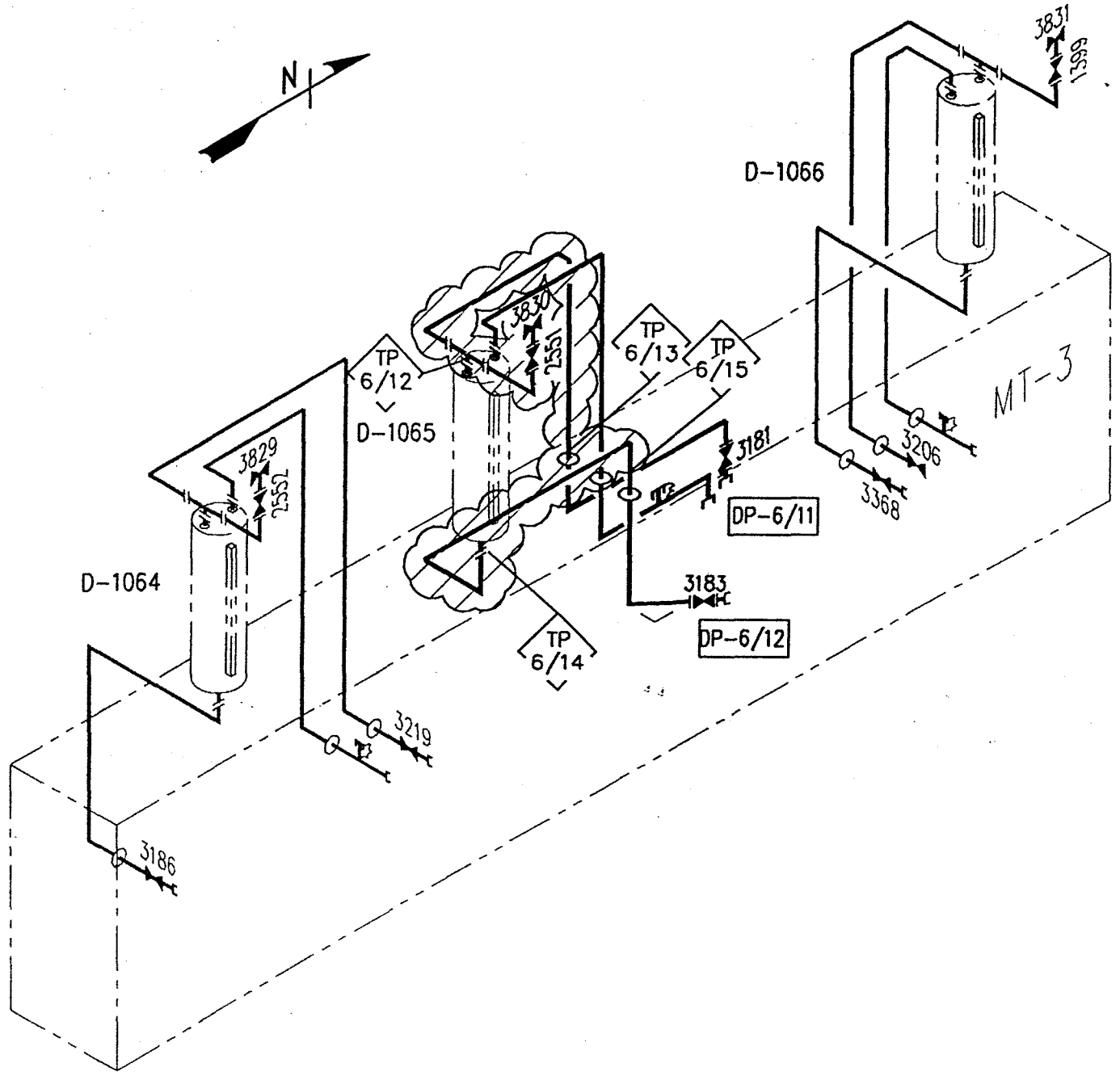
Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163–7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.

Figure 23: System #9 – Subsystem #6



NOTES:

1. ALL VALVE NUMBERS ARE PRECEDED BY "HV" IN THE FIELD UNLESS OTHERWISE NOTED.

D-1064: URANIUM FILTRATE TANK
D-1065: STRIP COLUMN/U PRECIP. FEED TANK
D-1066: URANIUM FILTRATE TANK

SYSTEM 9 (SPECIAL RECOVERY ROOM 146)

SUB-SYSTEM 6

SYMBOLS

DP-## DRAIN POINT

TP ## TERMINATION POINT

Drawn By:	Checked By:	Internal Drawing Number
J. TRUJILLO		T0100394-X027

Title Block Sheet 1 of 1

Excerpt of Master Drawing Number: 28163-7 Revision / Issue A

Approved for use with IWCP/Authorization Project Number: T0100394

Note: All approval and classification signatures are submitted with the Engineering Order form.