ATTACHMENT B

Treatment by Generator Request
241-Z Treatment Tank

I. Treatment by Generator for Waste Tank D-5, 241-Z Treatment Tank, 200 West Area

A. Generator Waste Description

Tank D-5, located at the 241-Z Building receives liquid mixed waste (MW) from the Plutonium Finishing Plant (PFP) process operations, development and analytical laboratories. Treatment procedures are performed in Tank D-5 in order to make the waste solution amenable for storage in the 200 West Area Tank Farms double shell tanks (DST). The solutions collected in Tank D-5 include those jetted from accumulation Tanks D-4, D-7 and D-8, D-5 sump, and those drained from 236-Z facility tankage 39, 19, WM-1, and 40. All these waste solutions are pumped or jetted to the DST.

The liquid MW, originating from the PFP, is comprised of three waste streams: 1) Plutonium Reclamation Facility (PRF) high-salt waste; 2) Remote Mechanical C Line (RMC) high-salt waste; and, 3) low-salt waste generated from both PRF, RMC, and development and analytical laboratories (D&AL).

1. PRF High-Salt Waste Solutions. The PRF uses a continuous solvent extraction (SX) process to convert various plutonium bearing materials to a concentrated plutonium nitrate product. Feed to the SX process is a plutonium-rich solution produced from the Miscellaneous Treatment (MT) System, and similar sources. The MT System dissolves solid plutonium-bearing materials, such as reactive scrap, to generate the plutonium-rich solution purified in the PRF SX process.

Purification is accomplished by contacting the plutonium-rich solution with a tributylphosphate (TBP)/carbon tetrachloride organic phase, followed by contact with a nitric acid-hydroxylamine nitrate (HN) solution. The purification process concentrates plutonium as plutonium nitrate in a solution suitable for use as feedstock in the Remote Mechanical C Line (RMC) process described below. The purification process involves several different steps utilizing stripping columns that generate corresponding waste solutions. These waste solutions, called the PRF high-salt waste (HSW) are sent to 241-Z for treatment and eventual disposal, via Tank D-5, to the DST.

The PRF HSW includes aqueous solutions of nitric acid, dilute sodium carbonate, waste metal nitrates, and organic degradation products, such as butanol, dibutyl and tributylphosphate, and carbon tetrachloride, from the SX process. It is known to be a dangerous waste due to its corrosivity (pH <2.0) from its 2.5 Molar

concentration of nitric acid. Thus, the PRF HSW is designated as D002.

Available information indicates that the PRF HSW may contain sufficient concentrations of chromium and lead to designate the waste as D007 and D008 for the characteristic of EP Toxicity. The presence of nitric acid, aluminum nitrate, potassium hydroxide, and potassium fluoride may, if concentrations are high enough, cause the PRF HSW to be book designated WT01 for acute toxicity.

The presence of trace carbon tetrachloride in the PRF HSW does not cause it to be a listed waste, because the carbon tetrachloride is not used in a degreasing operation, as must be the case to meet the listing under F001. Tributylphosphate is not a listed solvent. The remaining compounds are degradation products, and are not present in the purification process as solvents or active ingredients.

2. RMC High-Salt Waste Solutions. Plutonium nitrate feedstock solutions (feedstock) from either PRF or the Plutonium Uranium Extraction Plant (PUREX) are transferred to Glovebox HC-7C. The feedstock arrives in about 10 liter batches, and the acidity, plutonium concentration, and plutonium valence are adjusted in Glovebox HC-7C to ensure optimal performance of the plutonium reclamation process.

   Plutonium is reclaimed from the adjusted feedstock through four different unit operations. These operations involve conversion of the feedstock to plutonium oxalate, plutonium oxide, and finally plutonium tetrafluoride. The final conversion operation occurs in a fluorinator, which produces off-gases containing hydrogen fluoride (HF) gas and water vapor.

   The fluorinator off-gases are routed to the HA-46 cell, where residual HF is scrubbed using a potassium hydroxide solution. The scrubbed off-gases are discharged to the building ventilation exhaust system. The potassium hydroxide scrub solution is recycled until depleted, at which time it is sampled and then drained to Tank D-8 in the PFP Facility.

   The depleted scrub solution is called the RMC high-salt waste (HSW). The HSW consists of 5 molar potassium hydroxide and 6 molar potassium fluoride. The HSW is known to be a dangerous waste due to corrosivity (pH > 12.5), and is designated D002. Available information also indicates that concentrations of potassium hydroxide and potassium fluoride in the RMC HSW may be high enough to book designate the waste as WT01 for acute toxicity.

3. Low-Salt Waste Solutions, PRF, RMC, and D&AL. The low-salt wastes (LSW) from both PRF and RMC originate from filtrate evaporator distillate, and steam jacket condensates from the filtrate and product evaporators. The PRF and RMC LSW are aqueous solutions

containing nitric acid, and low concentrations of metal compounds. In addition, the PRF LSW may contain trace amounts of butanol and carbon tetrachloride carried over from the PRF SX process. Both PRF and RMC LSW are sent to Tank D-4 and Tank D-7 for accumulation prior to being transferred to and treated in Tank D-5.

The other source of LSW is the D&AL laboratory concentrator waste and decontamination waste streams. The D&AL LSW is an aqueous solution containing nitric acid, and traces of metal compounds. The D&AL LSW is collected in Tank D-4 and accumulated in Tank D-7 prior to transfer and treatment in Tank D-5.

All three LSW are likely dangerous waste due to corrosivity (pH < 2), and would be designated D002. Based on available information, the PRF and RMC LSW may contain sufficient concentrations of metal compounds to be book designated for acute toxicity, with PRF LSW being potentially WT01 and RMC LSW being potentially WT02. The D&AL LSW appear to have metal compound levels too low to cause book designation for acute toxicity. PRF LSW may contain trace levels of organic compounds, however, it would not be a listed waste for the reasons already discussed for the PRF HSW. Available information indicates that none of the LSW would contain levels of chromium or lead sufficient to cause designation by the EP Toxicity characteristic.

B. Waste Treatment Process Description

The purpose of the treatment conducted in Tank D-5 is to make the liquid wastes generated during the PFP activities amenable for storage in the 200 West Area Tank Farms DST. The treatment involves the addition of sodium hydroxide and sodium nitrites to meet double-shell tank storage criteria. The caustic and nitrite additions are done to inhibit corrosion in transfer lines and double-shell tanks.

Tank D-5 is located in the 241-Z Waste Handling facility. The facility consists of eight tanks: D-4, D-5, D-6, D-7, D-8, D-9, D-10, and an overflow tank. Tank D-6 is presently out of service, Tank D-9 stores caustic used in the treatment process, and Tank D-10 is used for ferric nitrate and sodium nitrite mixing and transfer to D-5. All waste process tankage reside in a below grade reinforced concrete cell, one cell dedicated to each of the five process tanks (D-4 through D-8).

Tank D-5 is a 4,300-gallon stainless steel, all-welded tank. It is a cylindrical tank, 10 feet in diameter and 8 feet in height. The tank is equipped with instrumentation which determines the weight factor of the waste as a tank level measurement. A level alarm indicates when the tank liquid level limit has been exceeded.

When sufficient waste has accumulated, the weight factor is calculated so that the necessary quantity of caustic can be introduced to Tank D-5. The agitator is activated to thoroughly

mix the contents. The 200 West Area Tank Farms criteria specifies a pH of greater than or equal to 12.0. The necessary quantity of caustic is added to raise the liquid waste to a final caustic molarity of 1.8 M. Approximately forty pounds of sodium nitrite are then added to the waste liquid, to achieve a concentration of greater than or equal to 6.7 pounds sodium nitrite per gallon. Additionally, a small amount of 45% ferric nitrate is added to the solution as a part of waste treatment. Upon notification of Tank Farms Operations acceptance, the waste liquid is pumped or jet transferred to the DST.

Operational controls and safety considerations are strictly adhered to during treatment and transference operations. Tank levels are continuously monitored. Chemical reagents are slowly added to the waste to prevent a radical reaction. Extreme care is exercised in the collection and handling of samples.

II. Comparison with State Treatment by Generator Criteria

The criteria established by Ecology in TIM No. 86-3, as presented in preamble of this attachment, were reviewed with respect to the Tank D-5 treatment process. Following is a discussion of how the Tank D-5 treatment process satisfies each of Ecology's criteria.

A. Inherent Risk of the Treatment Process.

Treatment in Tank D-5 is a low risk process. The major risk of treatment in Tank D-5 is the potential for generation of gases and fumes during the addition of the caustic solution to the wastes. The tanks, and cells, are vented by a four inch and fifteen inch, respectively, vitrified clay exhaust vent unit. The cell is maintained at a slight negative pressure by a High Efficiency Particulate Air (HEPA) filtration system. All treatment and transference is remotely accomplished, thereby reducing human contact with the waste. Any potential tank overfill or leak would be collected in the cell sump and jet transferred into Tank D-5 for subsequent treatment with a later batch after the tank level has been reduced or the tank has been repaired to prevent further overfills or leaks.

The treatment process occurs in a contained vessel and is managed in accordance with all applicable requirements and presents a low risk to public health and the environment.

B. Waste Toxicity.

Wastes treated in Tank D-5 are dangerous primarily due to their radioactive nature. The waste mixtures are also corrosive and contain low concentrations of toxic and/or EP toxic constituents. These wastes have been treated to meet Tank Farm acceptance criteria. Acceptance of the waste by Tank Farms facilitates further treatment activities in the Grout Treatment Facility and/or the Hanford Waste Vitrification Plant which will immobilize the toxic constituents, therefore this criteria is met.

C. Risk and Probability of Release.
The principal avenues of potential release from Tank D-5 would be to the air and secondary containment system in the cell. The air does not pose a risk because it is withdrawn and filtered by the HEPA filter system prior to discharge to the atmosphere. A filter management program is in place to maintain filter efficiency and detect failures of the filter system.

Releases to the cell containment system and sump are properly returned to the tank. No potential exists for human or environmental contact with the wastes in the cell containment system or sump.

The design of the PFP Waste Facility reduces the risk and probability of a release to the environment and therefore meets this criterion.

D. Relative Benefit to the Environment.
Treatment of wastes in Tank D-5 renders those wastes amenable for storage at the 200 West Area Tank Farms double-shell tanks. If treatment was not performed, the waste could not be stored in double-shell tanks and other methods of waste management would have to be considered. Alternate storage options do not exist at this time.

Treatment of the waste has an increased benefit to the environment by making the waste amenable for storage and, therefore, meets this criterion.

III. Compliance with Generator Accumulation Requirements.

The following information presents the measures taken toward meeting the applicable generator accumulation requirements set forth in WAC 173-303-200(1) and ensuring compliance for the Tank D-5 tank system and the treatment processes conducted in the tank.

General Requirements

A. Transfer of Dangerous Wastes to a Permitted Facility Within Ninety Days of Generation, WAC 173-303-200(1)(a)
Wastes that accumulate in Tank D-5 are treated and transferred promptly after treatment to the DST. Due to the nature of the operation and the volumes and rates in which wastes are generated, there has not been an occasion, or is one anticipated, for wastes to reside in Tank D-5 for longer than ninety days. The average time that wastes reside in Tank D-5 prior to treatment and transfer is approximately two weeks.

Data sheets are maintained for wastes that accumulate in Tank D-5. Information recorded on the data sheets includes the date and quantity of waste received. The data sheets are used for both

residence time monitoring and receiving volume verification. They can also be used to provide the data for substantiating that wastes never reside in Tank D-5 for longer than ninety days after they are generated.

B. Labeling, WAC 173-303-200(1)(d)
Plant personnel rarely have physical access to Tank D-5. The general public never has access to the tank or the cell. Activities and procedures clearly recognize the contents of and hazards associated with Tank D-5, and personnel are trained accordingly. Any labeling requirements under the federal Atomic Energy Act are currently satisfied.

Addition of hazardous waste and major risk labels to tanks is currently being evaluated. It may not be possible to place labels directly on tanks without excessive radiation exposure to personnel. However, the existing systems for marking and labeling TSD units provides an equivalent level protection.

C. Personnel Training, WAC 173-303-330
A personnel training plan will be prepared and implemented by the end of 1989. Facility personnel attend the Generator Hazards Safety Course (Course Number 006G) presented on the Hanford Site. Dangerous waste on-the-job training (Course Number 006H) is provided annually to personnel who manage the waste in the tank. Training records for facility personnel are maintained and updated at the Hanford Site. When completed, the training plan will be available at the 241-Z facility.

D. Preparedness and Prevention, WAC 173-303-340
The PFP Facility has both an internal and external telephone communication system. Emergency communication devices (e.g. two-way radios) are also available for personnel working near the location of the treatment tank. In addition, backup visual contact is required of all personnel working in the tank area. Fire control equipment is available. Arrangements and agreements have been made with non-Hanford Site parties who might be expected to respond in the event of emergencies, and these arrangements are documented in Memorandums of Understanding.

E. Contingency Plan and Emergency Procedures, WAC 173-303-350
An overall Hanford Site emergency plan exists and addresses emergencies that may occur at the Hanford Site. In addition, a facility-specific emergency plan exists, and is scheduled to be modified and implemented by October, 1989 to reflect additional emergency procedures specifically for the Tank D-5 tank system. The Hanford Site emergency plan is, and the modified facility-specific emergency plan will be available and maintained at 241-Z building. The facility-specific emergency plan will be amended as needed to ensure that it is kept current and accurate.

F. Emergencies, WAC 173-303-360

The appropriate procedures, as described in the Hanford Site emergency plan and the facility-specific emergency plan will be followed in the event of emergencies. Emergencies associated with the Tank D-5 tank system that require implementation of the Hanford Site emergency plan or the facility-specific emergency plan will be reported as soon as they are detected to appropriate state and/or local agencies who have response roles. Follow up written reports will be submitted to Ecology within fifteen days after emergencies that require implementation of the emergency plan.

Emergencies that could threaten human health or the environment outside the 241-Z facility will be reported as soon as detected to Ecology and the National Response Center. In addition, reports of releases from Tank D-5 will be submitted as described under Section III.L., below.

Requirements for Tank Systems

G. Applicability, WAC 173-303-640(1)

The requirements of WAC 173-303-640 apply to the accumulation and treatment of dangerous wastes in tanks by generators; Except that, WAC 173-303-640(8)(c) does not apply, and in lieu of WAC 173-303-640(5)(b)(iii) for uncovered tanks, a minimum freeboard of two feet must be maintained.

Tank D-5, including its components, is an existing tank system as defined in WAC 173-303-040. Thus, the requirements of WAC 173-303-640 applicable only to new tank systems or components are not relevant to Tank D-5.

WAC 173-303-640(2), assessment of existing tank system's integrity, requires that an assessment of Tank D-5 be conducted by January 12, 1990.

WAC 173-303-640(4), containment and detection of releases, will not be applicable to Tank D-5 containment system until January 12, 1991.

H. Integrity Assessment, WAC 173-303-640(2)

A tank system integrity assessment has been performed and will be certified by an independent, qualified, registered professional engineer. This assessment is described below. The assessment of the integrity of Tank D-5 tank system is based on existing structural, design, construction, materials, and other information. The integrity assessment is available at the office of the manager of the PFP Environmental Compliance group. It represents the best available assessment, consistent with protection and safety of Hanford Site personnel and the environment.

Ultrasonic assessments of Tank D-5 are conducted every two years; the last assessment was performed April 2, 1987 and the next one is scheduled for completion in June 1989. The ultrasonic assessment

tests the tank wall thickness at various representative locations. In addition, hoop-stress type calculations have been performed and documented to determine the minimum acceptable shell thickness. To date, these assessments and calculations have not disclosed any signs of tank distress. Coupled with information gathered during the biannual pit entries (see Section III.K., below), the structural integrity of the Tank D-5 tank system appears to be sound.

I. Containment and Detection of Releases, WAC 173-303-640(4)

As described in Section I.A., above, Tank D-5 and ancillary piping and connections are protected with secondary containment by residing in a concrete cell. The concrete cell has a calculated capacity of 40,000 gallons. The cell is constructed of reinforced concrete, with a 6 inch floor and walls of 1 foot thickness. A commercial vinyl coating was applied to all exposed concrete surfaces at the time of construction. A sump in the cell floor is equipped with automatic leak detection via a conductance probe and alarm. Integrity assurance of the sump probes is described in section K below. The sump also acts as a collection device for any waste which may accumulate in the bottom of the cell. These collected wastes are steam jetted directly back into Tank D-5. Ancillary piping is contained in a concrete pipe trench with a 7 inch floor and 6 inch walls. The pipe trench gravity drains to the floor of the 241-Z facility and is routed to Tank D-5 for treatment.

J. General Operation, WAC 173-303-640(5)

Dangerous wastes and chemical treatment reagents are not placed in the Tank D-5 tank system if they could cause the tank to leak, rupture, or otherwise fail. Spillage is contained in the cell sump and is steam jetted directly back into Tank D-5. The tank is equipped with a weight factor detector, recorder and alarms (low and high level) so that tank level may be monitored. In the event of an overflow, wastes are routed via a 6 inch line to a concrete overflow tank in an adjacent cell, which is eventually steam jetted to Tank D-5 for treatment after the tank level has been reduced or the tank has been repaired to prevent further overfills or leaks. The overflow tank is equipped with a conductance probe and alarm so as to monitor the presence of waste in the tank.

Labeling of the cover block over the tank is in accordance with Section III.B., above. The Tank D-5 tank system does not handle extremely hazardous waste that is toxic by inhalation, and treatment processes are operated to prevent the generation and release of such emissions.

K. Inspections, WAC 173-303-640(6) and 173-303-320(1), (2)(a), (b), and (d), and (3)

Written procedures exist for treatment operations to ensure personnel inspect the alarms, conductance probes, and overflow devices, associated with Tank D-5. General inspection of the PFP Facility occurs as part of standard operations, and waste level monitoring equipment for Tank D-5 are checked continuously. In addition, a routine preventative maintenance schedule exists, and calls for biannual pit entries for underground tank testing. Two routine maintenance procedures are performed on the leak detection probes in the 241-Z sump pit. Preventative maintenance is performed monthly, and is a simple check of the alarm circuitry. An annual inspection of the probe and full test of the alarm circuit (via shorting the probe) is also performed.

Due to the radioactive nature of the dangerous wastes treated in Tank D-5, physical observation of the some portions of the tanks systems during operation exceeds regulatory limits for radiation exposure. Further evaluation of alternate methods for meeting the intent of physical inspection requirement is being performed. A petition for rulemaking change to the physical inspection requirements will be submitted to the EPA and Ecology by September 30, 1989 in accordance with the Hanford Federal Facility Agreement and Consent Order milestone M-22-01.

L. Response to Releases, WAC 173-303-640(7)

When a leak or spill from the Tank D-5 tank system is detected, the flow or addition of dangerous wastes and/or treatment reagents to the tank will be stopped. If necessary to prevent continued releases from the treatment tank, the tank will be emptied to an upsteam accumulation tank. The cause of the leak or spill will be determined. Appropriate measures will be taken to correct the cause of the leak or spill before the tank is reintroduced to service. Releases to secondary containment systems will be removed immediately upon detection to an upstream accumulation tank. Any major repairs required as a result of a spill or leak from Tank D-5 will be certified to Ecology by an independent, qualified, registered professional engineer.

If releases to the environment are detected as a result of a spill or leak from the treatment tankage, such releases will immediately be contained. Environmental releases, if they occur, will be removed and their impacts on the environment will be mitigated. Releases to the environment in excess of applicable Reportable Quantities, or 1 pound, whichever is less, will be reported to Ecology within 24 hours of detection. The National Response Center will be notified pursuant to 40 CFR Part 302. If the 24 hour report to Ecology is necessary, it will be followed up by a written report on the release from Tank D-5.

M. Closure and Post-Closure Care, WAC 173-303-640(8)

At closure, dangerous wastes, and contaminated equipment and structures (including underlying materials contaminated with dangerous wastes or dangerous waste constituents) will be removed from the treatment tankage and surrounding area, decontaminated, or stabilized and closed as a landfill. A closure plan, specific to Tank D-5, is being developed.

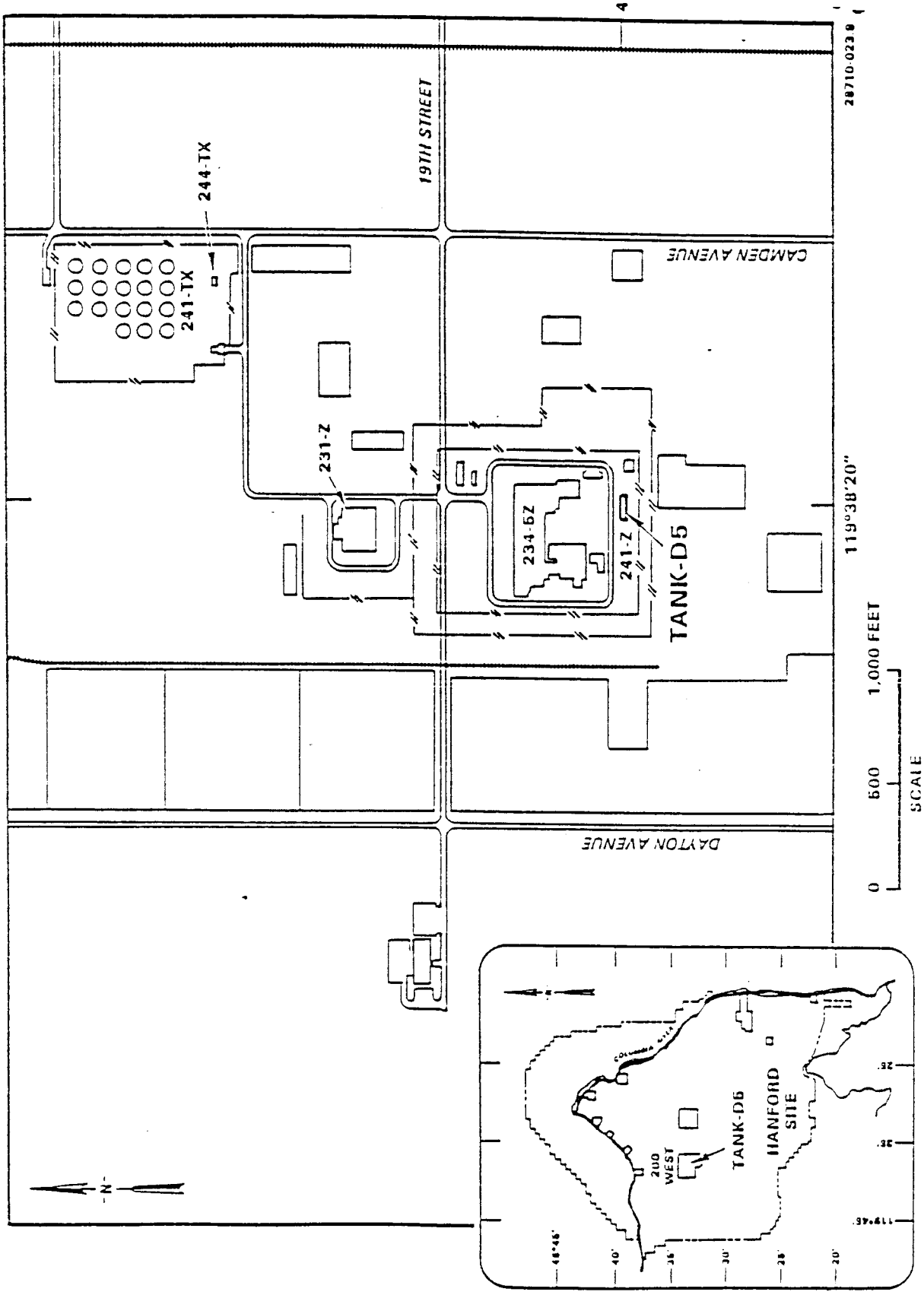
Closure of Tank D-5 and surrounding area will be performed in a manner that will:

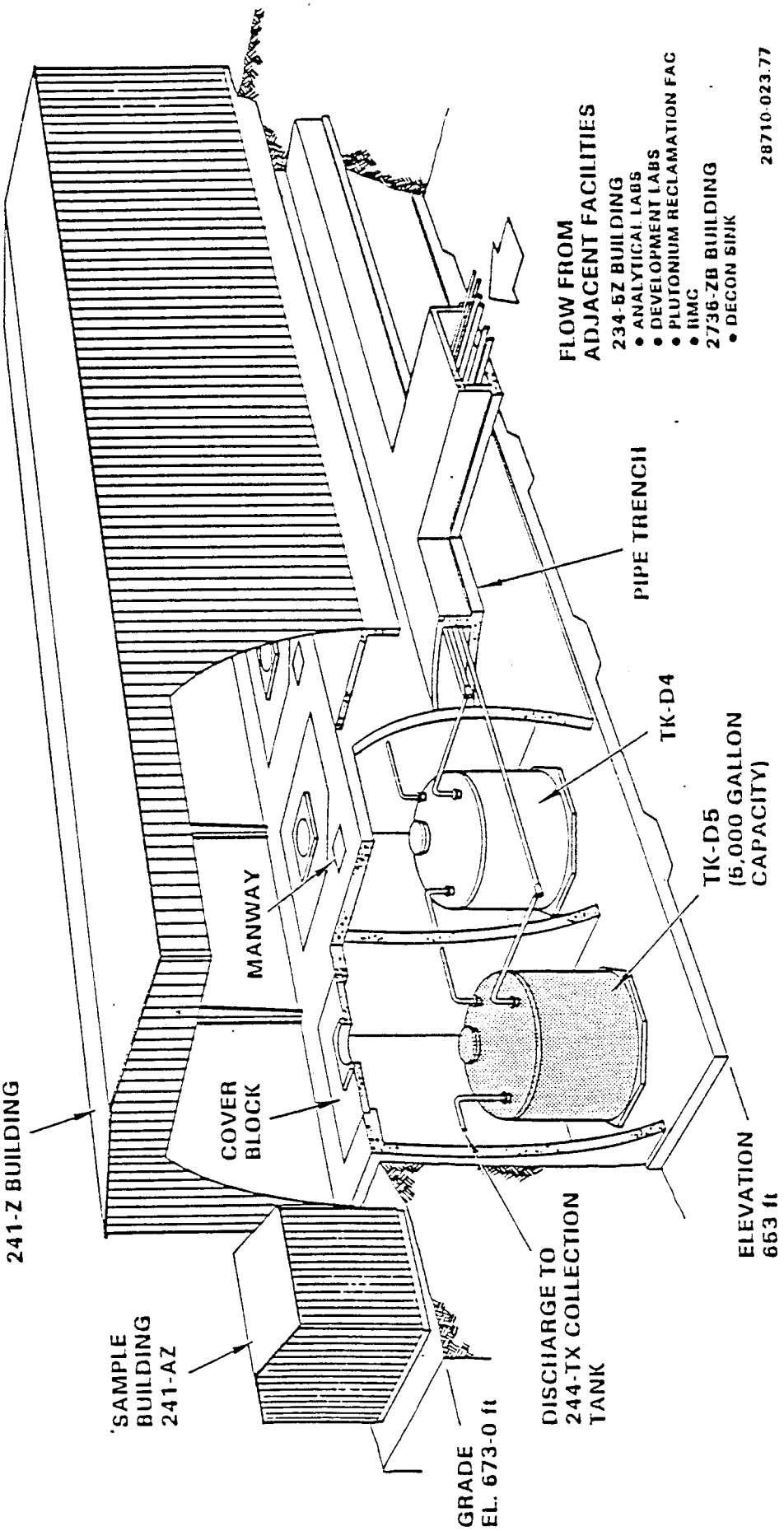
- o minimize the need for further maintenance;
- o control, minimize, or eliminate post-closure releases that could threaten human health or the environment;
- o achieve the removal and decontamination criteria of WAC 173-303-610(2)(b); and
- o be consistent with the requirements of the Atomic Energy Act and ALARA goals.

N. Special Requirements, WAC 173-303-640(9) and (10)

The Tank D-5 does not receive or handle ignitable, reactive, or incompatible dangerous wastes. Treatment processes in the tank are conducted to prevent the introduction and generation of ignitable, reactive, and incompatible wastes and materials. The interior of the tank and ancillary piping is compatible with all dangerous wastes and treatment reagents managed in the tank system.

241-Z BUILDING TANK-D5 SITE PLAN




241-Z BUILDING
TANK D5
241-Z BUILDING
COVER BLOCK
MANWAY
SAMPLE BUILDING 241-AZ
GRADE EL. 673-0 ft
DISCHARGE TO 244-TX COLLECTION TANK
ELEVATION 653 ft
TK-D5 (5,000 GALLON CAPACITY)
TK-D4
PIPE TRENCH
FLOW FROM ADJACENT FACILITIES
234-5Z BUILDING
• ANALYTICAL LABS
• DEVELOPMENT LABS
• PLUTONIUM RECLAMATION FAC
• RMC
2736-ZB BUILDING
• DECON SINK
28710-023.77