

UTAH HAZARDOUS WASTE POST-CLOSURE PERMIT

FOR POST-CLOSURE OF THE WASTE DISPOSAL CELL  
AND FACILITY WIDE CORRECTIVE ACTION

FOR

The Former Pennzoil Roosevelt Refinery  
The Pennzoil - Quaker State Company d.b.a. SOPUS Products  
EPA# UTD073093874

Duchesne County, Utah

Original Permit: December 18, 1992  
Permit Renewal: June 11, 2004  
Permit Modification: August 10, 2009

Permit Renewal - September 30, 2014

Permit Modification: ~~March 2019~~ ~~October xx, 2018~~

## STATE OF UTAH PLAN APPROVAL

Effective Date: ~~October xx, 2018~~~~September 30, 2014~~September 30, 2018

### PERMITTEES:

Pennzoil – Quaker State Company d.b.a. SOPUS Products  
and  
Roosevelt Land Investment, Inc.

Duchesne County, Utah  
EPA Identification Number UTD073093874

Pursuant to the Utah Solid and Hazardous Waste Act, 19-6-101, et. seq., Utah Code Annotated 1953, as amended, and the regulations promulgated thereunder by the Utah Solid and Hazardous Waste Control Board, codified in the Utah Administrative Code R315, and pursuant to the Solid Waste Disposal Act, 42 U.S.C. 3251 et. seq., as amended by the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901 et. seq., and the Hazardous and Solid Waste Amendments of 1984 (HSWA), a plan approval (hereinafter called a permit), is issued to the Pennzoil-Quaker State Company d.b.a. SOPUS Products, and Roosevelt Land Investment, Inc.

(herein after called the “Permittees”), for post-closure care of the waste disposal cell and facility-wide corrective action at the Former Pennzoil Roosevelt Refinery, Duchesne County, Utah, at latitude 40° 16’ 48” North and longitude 110° 01’ 02” West.

The Permittees shall comply with all the terms and conditions of this permit. The permit consists of Modules 1 through 6 and Attachments 1 through ~~67~~. The Permittees must comply with all applicable State rules including Utah Admin. Code Code R315-15, 17, 101, 102, 103, and 260 through 320~~R315-1 through R315-14, R315-50, and R315-101~~. Applicable rules are those which are in effect on the date of issuance of this permit, also including rules in effect that relate to portions of the permit that are modified on March XX, 2019.

Applicable rules are those which are in effect on the date of issuance of this permit and any self-implementing provisions and related rules which, according to the requirements of HSWA, are automatically applicable to the Permittee’s hazardous waste management activities, notwithstanding the conditions of this permit.

This permit is based on the premise that the information submitted for the original permit which was issued on December 18, 1992, as modified by the submission of subsequent amendments, permit modification requests received throughout the term of the original permit, and the permit renewal application received January 9, 2014, as modified by submission of subsequent amendments is accurate. The Permittee’s failure in the application or during the permit issuance process to disclose fully all relevant facts, or the Permittee’s misrepresentation of any relevant facts at any time, shall be cause for the termination or modification of this permit, the initiation of enforcement action, including criminal proceedings, or any combination of these remedies.

The Permittees shall inform the Director of the Division of ~~Solid and Hazardous Waste~~ Waste Management and Radiation Control of any deviation from or changes in the information on which the application was based which would affect the Permittee's ability to comply with the terms and conditions of this permit. The Director will enforce all terms and conditions of this permit. Any challenges to any condition of this permit shall be appealed in accordance with the applicable provisions of the Utah Code Annotated and applicable administrative rules.

This permit ~~was~~ effective ~~on as of October xx, 2018~~ ~~September 30, 2014~~, September 30, 2014 and shall remain in effect until September 30, 2024, unless revoked and reissued, pursuant to Utah Admin. Code R315-~~270-413-4.2~~ or terminated, pursuant to Utah Admin. Code R315-~~3-4-4270-43~~ or continued in accordance with Utah Admin. Code R315-~~3-5-2270-51~~ and the conditions of this permit.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
Scott T. Anderson, Director  
Division of ~~Solid and Hazardous~~ Waste Management of Radiation Control

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## DEFINITIONS

For purposes of this permit, terms used herein shall have the same meaning as those in Utah Admin. Code R315-1 through R315-102, unless this permit specifically provides otherwise; where terms are not defined in the regulations or the permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

Act shall mean the Utah Solid and Hazardous Waste Act, Utah Code Annotated 19-6-101 et seq.

Board shall mean the Utah ~~Solid and Hazardous Waste~~ Waste Management and Radiation Control Board.

Day(s) shall mean sequential calendar days.

Director shall mean the Director of the Division of ~~Solid and Hazardous~~ Waste Management and Radiation Control.

Division shall mean the Division of ~~Solid and Hazardous~~ Waste Management and Radiation Control of the Utah Department of Environmental Quality.

Facility shall mean all contiguous land and structures and other appurtenances and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, and disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

Groundwater Treatment System shall mean all the parts of the system that are used to extract, treat or inject groundwater.

Hazardous waste constituent shall mean a constituent that caused the Board to list the hazardous waste in Utah Admin. Code R315-~~2261-1 through 32~~ and ~~R315-261 Appendix VIII~~ 50-10.

Precipitation shall mean rain, snow, sleet, or hail.

Release shall mean any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous waste constituents) into the environment.

Solid Waste Management Unit (SWMU) shall mean any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically managed.

Submit or Submission shall mean to be received by hand delivery, mail, certified mail, express mail, or facsimile and logged in at the offices of the Division of Solid and Hazardous Waste.

Surface impoundment or impoundment shall mean a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold an accumulation of liquid waste or waste containing free liquids, and is not an injection well. Examples of surface impoundments are holding, storing, settling, and aeration pits, ponds and lagoons.

Utah Registered or Registered Professional Engineer shall mean any individual who is registered as a Professional Engineer by any state's Department of Business Regulation or its equivalent and is qualified by experience and education in the appropriate engineering field.

All definitions contained in applicable sections of Utah Admin. Code R315 are hereby incorporated, in their entirety, by reference into this permit, except that any of the definitions used above shall supersede any definition of the same term stated in Utah Admin. Code R315.

MODULE I - STANDARD CONDITIONS

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I.A. EFFECT OF PERMIT

I.A.1. ~~The Permittee, Pennzoil – Quaker State Company d.b.a. Shell Oil Products US (SOPUS) Products~~ –is allowed to leave hazardous waste in place at the Site's Waste Disposal Cell in accordance with the conditions of this permit. ~~The Site is currently owned by Roosevelt Land Investment LLC. Both Pennzoil – Quaker State Company d.b.a. SOPUS Products and Roosevelt Land Investment LLC are the Permittees of this permit.~~ The Permittees ~~are~~ are required to inspect and monitor any hazardous waste area, including, but not limited to the Waste Disposal Cell and to monitor, extract, treat and contain hazardous waste constituents and contaminated groundwater resulting from past practices, in accordance with the conditions of this permit. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Section 3013 or Section 7003 of RCRA, Section 106 (a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9606 (a), commonly known as CERCLA or Superfund), or any other law providing for protection of human health or the environment.

I.B. LOCATION

I.B.1. The Waste Disposal Cell (WDC) is located in the area where ponds A, 1, 2, and 3 were located prior to consolidation and stabilization of sludge and soils from the ponds. For the purposes of this Permit in identifying the area to undergo monitoring and corrective action, this area will be referred to as the Waste Disposal Cell and WDC. These terms will be used synonymously and interchangeably.

I.C. NO WAIVER OF AUTHORITY

I.C.1. The Director expressly reserves any right of entry provided by law and any authority to order or perform emergency or other response activities as authorized by law.

I.D. PERMIT ACTIONS

I.D.1. This permit may be modified, revoked and reissued, or terminated for cause as specified in Utah Admin. Code R315-~~264-343-4~~. The filing of a request for a permit modification, revocation and reissuance, or termination, or the

notification of planned changes or anticipated noncompliance on the part of the Permittees ~~does~~ not stay the applicability or enforceability of any permit condition.

I.D.2. The permit may be modified at the request of the Permittees according to the procedures of R315-270-42 of Utah Admin. Code, ~~R315-3-4.3.~~

I.D.3. The Director may modify this permit when the standards or rules on which the permit was based have been changed by statute, amended standards or regulations, and/or rules or by judicial decision after the effective date of the permit.

I.D.4. All permit conditions within this permit will supersede conflicting statements, requirements, or procedures found within the attachments of this permit and the Permittees' application for it.

I.E. SEVERABILITY

I.E.1. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby. Invalidation of any state or federal statutory or regulatory provision which forms the basis for any condition of this permit does not affect the validity of any other state or federal statutory or regulatory basis for said condition.

I.F. DUTIES AND REQUIREMENTS

I.F.1. Duty to Comply. The Permittees shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of the Utah Administrative Rules and is grounds for enforcement action, permit termination, revocation and reissuance, or modification of the permit.

I.F.2. Duty to Reapply. The Permittees shall submit a complete application for a renewal of this permit at least 180 days before this permit expires.

I.F.3. Review of Permit. In accordance with the Utah Solid and Hazardous Waste Act, Utah Code Annotated 19-6-108(13), this permit shall be reviewed five (5) years after the effective date and modified, as deemed necessary by the Director.

I.F.4. Permit Expiration. The permit will expire ten years (10) years from the date of issuance. This permit and all conditions herein will remain in effect

beyond the permit's expiration date if the Permittee~~s~~ has submitted a timely, complete application, in accordance with Utah Admin. Code R315-~~270-10 through 413-2~~, and through no fault of the Permittee~~s~~, the Director has not issued a new permit as set forth in Utah Admin. Code R315-~~270-50 and 513-5~~.

- I.F.5. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for the Permittee~~s~~, in an enforcement action that it would have been necessary, to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
- I.F.6. Duty to Mitigate. In the event of noncompliance with the permit, the Permittee~~s~~ shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.
- I.F.7. Proper Operation and Maintenance. The Permittee~~s~~ shall, at all times properly operate and maintain all facilities and systems of treatment, control and monitoring (and related apparatus) which are installed or used by the Permittee~~s~~ to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.
- I.F.8. Duty to Provide Information. The Permittee~~s~~ shall furnish to the Director, within a reasonable time, any relevant information which the Director may request, to determine whether cause exists for modifying, revoking or reissuing this permit, or to determine compliance with this permit. The Permittee~~s~~ shall also furnish to the Director upon request, copies of records required to be kept by this permit.
- I.F.9. Inspection and Entry. Pursuant to Utah Admin. Code R315-~~260-52-42~~ and Utah Code Ann. 19-6-109, the Permittee~~s~~ shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:
- I.F.9.a. Enter at reasonable times upon the Permittee~~s~~'s premises where a regulated activity is located or conducted, or where records must be kept under the conditions of this permit;
- I.F.9.b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

- I.F.9.c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- I.F.9.d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Utah Solid and Hazardous Waste Act, any substances or parameters at any location.
- I.F.9.e. Make a record of inspections by photographic, electronic, video, or any other reasonable medium.
- I.F.10. Reporting Planned Changes. The Permittees shall give written notice to the Director prior to any planned physical alterations or additions to any hazardous waste management unit or system being permitted or previously permitted in accordance with Utah Admin. Code R315-~~270-303-3-1~~(1)(1) and R315-~~270-423-4-3~~. Planned physical alterations or additions shall include all changes in any hazardous and solid waste activities. No construction or operation of new or modified hazardous waste units shall begin unless the provisions of Utah Admin. Code R315-~~270-40 through 423-4~~ are met.
- I.F.11. Reporting Anticipated Noncompliance. The Permittees shall give advance notice to the Director of any planned changes in the permitted ~~Facility or~~ activity which may result in noncompliance with requirements of this permit. Advance notice shall not constitute a defense for any noncompliance.
- I.F.12. Transfer of Permit. This permit may be transferred to a new Permittees only if it is modified or revoked and reissued pursuant to Utah Admin. Code R315-~~270-403-4-1~~ and R315-~~270-413-4-2~~. Before transferring ownership or operation of the facility during its operating life, the Permittees shall notify the new Permittees in writing of the requirements of Utah Admin. Code R315-~~15, 17, 101, 102, 103, and 260 through 320-1 through R315-14, R315-50, R315-101, and R315-102.~~
- I.F.13. Monitoring and Records. The Permittees shall retain records of all monitoring information, including all calibration and maintenance records and, where applicable, all original strip chart recordings (or equivalent recordings) for continuous monitoring instrumentation, copies of all reports and records required by this permit, the waste minimization certification required by Utah Admin. Code R315-~~8-5-3. (40 CFR § 264-73(b)(9) incorporated by reference)~~, and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, certification, or recording unless a longer retention period for certain information is required by other conditions of this permit. These periods may be extended by request of the Director at any time by written notification to the Permittees and the retention times are

automatically extended during the course of any unresolved enforcement action regarding the Facility to three (3) years beyond the conclusion of the enforcement action. Pursuant to Utah Admin. Code R315-~~270-303-3.4~~(j), records of monitoring information shall specify at a minimum:

- I.F.13.a. The date(s), exact place, and times of sampling or measurements;
- I.F.13.b. The name(s), title(s), and affiliation of individual(s) who performed the sampling or measurements;
- I.F.13.c. The date(s) analyses were performed;
- I.F.13.d. The individual(s) who performed the analyses;
- I.F.13.e. The analytical techniques or methods used; and
- I.F.13.f. The results of such analyses.
- I.F.14. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample to be analyzed shall be the appropriate method from Utah Admin. Code R315-~~261 Appendix I~~~~50-6~~ or an equivalent method approved by the Director. Laboratory methods shall be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846, Standard Methods of Examination of Water and Wastewater, or other alternate methods approved in this permit.
- I.F.15. Seventy-two ~~Twenty-four~~ Hour Reporting. The Permittee~~s~~ shall report to the Director any validated noncompliance with the permit which may endanger human health or the environment. Any such information shall be reported orally within seventy-two (72) ~~twenty-four (24)~~ hours from the time the Permittee~~s~~ becomes aware of the circumstances. This report shall include, but not be limited to, the following:
  - I.F.15.a. Information concerning the release of any hazardous waste which may endanger public drinking water supplies;
  - I.F.15.b. Information concerning the release or discharge of any hazardous waste, or of a fire or explosion at the facility, which could threaten the environment or human health outside the facility. The description of the occurrence and its cause shall include:
    - I.F.15.b.i. Name, address, and telephone number of the Permittee~~s~~;
    - I.F.15.b.ii. Name, address, and telephone number of the facility;

- I.F.15.b.iii. Date, time and type of incident;
- I.F.15.b.iv. Name and quantity of materials involved;
- I.F.15.b.v. The extent of injuries, if any;
- I.F.15.b.vi. An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and
- I.F.15.b.vii. Estimated quantity and disposition of recovered material that resulted from the incident. A written submission shall also be provided within five (5) days of the time the Permittees becomes aware of the circumstances. The written submission shall contain, but not be limited to: a description of the noncompliance and its cause; the periods of noncompliance (including exact dates and times); whether the noncompliance has been corrected; and if not, the anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Permittees need not comply with the five (5) day written notice requirement if the Director waives the requirement and the Permittees submits a written report within fifteen (15) days of the time the Permittees becomes aware of the circumstances.
- I.F.16. The Permittees shall comply with the reporting requirements outlined in Utah Admin. Code R315-~~263-30 through 349~~ in effect at the time of the incident. The Permittees shall additionally notify the Tri-County Health Department of any spill requiring reporting as outlined in this condition.
- I.F.17. Monitoring Reports. Monitoring reports shall be reported at the intervals specified elsewhere in this permit.
- I.F.18. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each scheduled date.
- I.F.19. Submittal of Schedules. The reports indicated in I.F.16. shall be submitted to the Director or a duly appointed representative of the Director.
- I.F.20. Transfer of Reports. These reports shall be submitted using the United States Postal Service, any licensed delivery service, facsimile, computer CD or hand delivered by the Permittees, to be logged in at the offices of the Division of Solid and Hazardous Waste.

- I.F.21. Biennial Report. A biennial report shall be submitted as required by Utah Admin. Code R315-~~264-758-5.6~~.
- I.F.22. Other Noncompliance. The Permittees shall report all other instances of noncompliance not otherwise required to be reported above, at the time monitoring reports, as required by this permit are submitted.
- I.F.23. Other Information. Whenever the Permittees becomes aware that he failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the Permittees shall submit such facts or corrected information within seven (7) working days.
- I.F.24. Certification of Construction or Modification. The Permittees may not commence storage, treatment, or disposal of hazardous waste in a new hazardous waste management unit or an existing unit being modified at the permitted facility until:
- I.F.24.a. The Permittees ~~has~~have submitted to the Director:
- I.F.24.a.i. A letter signed by the Permittees and a qualified Utah registered professional engineer stating that the unit has been constructed in compliance with this permit; and
- I.F.24.a.ii. As-built engineering plans and specifications; and
- I.F.24.b. The Director has reviewed and inspected the newly constructed facility and has notified the Permittees in writing that the unit was found in compliance with the conditions of this permit; or
- I.F.24.c. The Director has either waived the inspection, or has not within fifteen (15) days of the date of his receipt of the above submission, notified the Permittees of an intent to inspect.
- I.G. SIGNATORY REQUIREMENT
- I.G.1. All reports or other information requested by the Director shall be signed and certified as required by Utah Admin. Code R315-~~270-113-2.2~~.
- I.H. CONFIDENTIAL INFORMATION
- I.H.1. The Permittees may claim confidential any information required to be submitted by this permit in accordance with Utah Code Ann. §§ 63G-2-309 and 19-1-306.

I.I. DOCUMENTS TO BE MAINTAINED AT SPECIFIED LOCATION

I.I.1. The Permittees shall submit the following documents and amendments, revisions, and modifications to these documents to the Director, to be maintained at the Division of Solid and Hazardous Waste on the 2nd floor of the Multi-Agency State Office Building, 195 North 1950 West, Salt Lake City for the duration of the post-closure care period:

I.I.1.a. The post-closure permit application;

I.I.1.b. Post-closure monitoring records, to include groundwater monitoring records and analytical results, groundwater treatment system unit records and analytical results, and records of the effectiveness of the groundwater treatment system, as required by this permit;

I.I.1.c. Certification of closure as required by Utah Admin. Code R315-~~264-110~~ through ~~1207-14~~;

I.I.1.d. Reserved;

I.I.1.e. Inspection schedules as required by Utah Admin. Code R315-~~264-15(b)8-2.6(b)~~ and this permit; and,

I.I.1.f. All applicable portions of the Operating Record requirements of Utah Admin. Code R315-8-5.3. and this permit;

I.I.1.g. Manifest copies as required by Utah Admin. Code R315-~~264-70 through 727-12.2(a)(5) and R315-7-12.2(b)(5)~~ and this permit.

I.J. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

I.J.1. Pursuant to Section 3005(c)(3) of RCRA (Section 212 of HSWA), codified as 40 CFR 270.32(b), and Utah Admin. Code R315-~~270-323-3.3~~(b)(2), this permit contains those terms and conditions determined necessary to protect human health and the environment.

## MODULE II - GENERAL FACILITY STANDARDS

### II.A. POST-CLOSURE MAINTENANCE AND MONITORING

II.A.1. The Permittee~~s~~ shall monitor the Waste Disposal Cell throughout the post-closure care period, which commences on the effective date of this permit, in a manner that will ensure detection of a release of hazardous waste, hazardous waste constituents, leachate, contaminated runoff or hazardous waste decomposition products to the soil, groundwater, or surface water from the closed facility. The Permittee~~s~~ shall maintain all treatment, containment and monitoring equipment throughout the post-closure care period in a manner that will ensure detection of a release from the closed facility and minimize the possibility of a fire, explosion, or any sudden or non-sudden release of hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

### II.B. SECURITY

II.B.1. The Permittee~~s~~ shall comply with the following security conditions:

II.B.1.a. A fence with locking gates surrounding the closed Waste Disposal Cell on all sides, which prevents unauthorized entry, shall be maintained throughout the post-closure care period.

II.B.1.b. Signs which read “DANGER, UNAUTHORIZED PERSONNEL KEEP OUT” shall be posted at the entrance gates and every 100 feet along the fence and shall be maintained throughout the post-closure care period. The signs shall be legible from a distance of at least 25 feet in compliance with Utah Admin. Code R315-~~264-148-2.5~~(c).

II.B.1.c. All security equipment shall be routinely inspected throughout the post-closure care period. The Permittee~~s~~ shall incorporate those security items (i.e. fence, signs of vandalism, etc.) to be inspected and the frequency of inspection on the inspection checklist which is required to be submitted by Condition II.D.1.

II.B.1.b. Damaged security equipment shall be noted in the inspection checklist and repairs shall begin within one (1) month. Repairs shall be completed as soon as practicable, but not later than two (2) months after the problem is discovered.

II.B.2. The Permittee~~s~~ shall comply with all other security procedures as specified in Attachment 1.

II.C. PERSONNEL TRAINING

II.C.1. The Permittees shall conduct personnel training as required by Utah Admin. Code R315-~~264-168-2.7~~. Training shall be conducted in accordance with the program outlined by Attachment 4.

II.C.2. The Permittees shall maintain training documents and records as required by Utah Admin. Code R315-~~264-168-2.7~~(d) and (e), and shall record the type and amount of training received by each employee involved in hazardous waste management.

II.C.3. New personnel working with the post-closure care and/or groundwater treatment and/or containment units shall complete the required personnel training within six (6) months of their hire date. These records shall indicate the type and amount of training received.

II.D. GENERAL INSPECTION REQUIREMENTS

II.D.1. The Permittees shall follow the inspection schedules as specified in Attachment 2.

II.D.2. Upon discovering any deterioration or malfunction that may result in a threat to human health or the environment, the Permittees shall remedy said threat as required by Utah Admin. Code R315-~~264-158-2.6~~(c) within one (1) month. If the remedy requires more time the Permittees shall submit to the Director, before the expiration of the one (1) month period, a proposed time schedule for correcting the problem. Where a hazard is imminent or has already occurred, remedial action shall be taken immediately.

II.D.3. Records of inspections shall be submitted to the Director and kept at the Division of Solid and Hazardous Waste offices, on the 2nd floor of the Multi-Agency State Office Building, 195 North 1950 West, Salt Lake City, Utah.

II.D.4. Any problem which could endanger human health or the environment (tank rupture, dike failure, transportation spills, etc.) shall be corrected as soon as possible, but no later than the next working day from the time the problem is discovered.

II.D.5. The Permittees shall inspect on a semi-annually basis all monitoring wells, extraction wells, and injection wells that are part of the groundwater monitoring system as specified below:

- II.D.5.a. Inspect for damage to the above ground casing;
- II.D.5.b. Inspect for damage to cement apron and assure that the annulus is properly sealed;
- II.D.5.c. If permanent, dedicated, pumps are used, verify proper operation;
- II.D.5.d. Check for visible damage and tampering to locks and monitoring well caps and;
- II.D.5.e. Insure that the wells are accessible and visible to all appropriate personnel.

#### II.E. CONTINGENCY PLAN

- II.E.1. Implementation of Plan. When dictated by the Contingency Plan, the Permittees shall immediately carry out the provisions of Attachment 3, and follow the emergency procedures described by Utah Admin. Code R315-~~264-568-4.7~~. The Permittees shall comply with Utah Admin. Code R315-9 in reporting releases to the Director.
- II.E.2. Copies of Plan. The Permittees shall comply with the requirements of Utah Admin. Code R315-~~264-538-4.4~~.
- II.E.2. Amendments to Plan. The Permittees shall review and immediately amend, if necessary, the contingency plan, as required by Utah Admin. Code R315-~~264-548-4.5~~.

#### II.F. RECORDKEEPING AND REPORTING

- II.F.1. The Permittees shall submit reports as required to the Director documenting post-closure monitoring activities and results from analyses of samples collected in compliance with closure and post-closure monitoring requirements. Copies of all appropriate records will be maintained at the Division of ~~Solid and Hazardous~~ Waste Management and Radiation Control offices, on the 2nd floor of the Multi-Agency State Office Building, 195 North 1950 West, Salt Lake City, Utah.

#### II.G. FINANCIAL ASSURANCE FOR POST-CLOSURE CARE

- II.G.1. The Permittees shall maintain continuous compliance with Utah Admin. Code R315-~~264-114 through 1518-8~~.

#### II.H. COST ESTIMATES FOR THE FACILITY POST-CLOSURE CARE

II.H.1 The Permittees's post-closure cost estimate shall be prepared in accordance with Utah Admin. Code R315-~~264-1448-8~~.

II.H.2. Within ninety (90) days after the end of each Pennzoil – Quaker State d.b.a. SOPUS Products Company fiscal year, the Permittees shall adjust the post closure cost estimate for the WDC for inflation or submit a revised cost estimate and submit a copy of that adjusted post closure cost estimate to the Director. For each new hazardous waste management unit placed into operation, an updated closure/post closure cost estimate to the facility shall be prepared which includes the new unit, sixty (60) days prior to waste being placed on or into the new unit.

II.H.3. The Permittees shall revise the post-closure cost estimate whenever there is a change in the facility's approved closure plan as required by Utah Admin. Code R315-~~8-8~~264 140 through 151.

II.H.4. When the post-closure permit is reissued, the cost of post-closure care will be extended for the duration of the permit, so that at all times the Permittees shall maintain sufficient funds to conduct 10 years of post-closure care.

## II.I. LIABILITY REQUIREMENTS

II.I.1. The Permittees shall maintain continuous compliance with Utah Admin. Code R315-~~264 140 through 1518-8~~, including documentation requirements, liability coverage for sudden accidental occurrences in the amount of at least one million dollars per occurrence with an annual aggregate of at least two million dollars, exclusive of legal defense costs, for the post-closure period.

II.I.2. The Permittees shall maintain continuous coverage for non-sudden accidental occurrences in the amount of at least three million dollars per occurrence with an annual aggregate of at least six million dollars, exclusive of legal costs, for the post-closure period.

## II.J. INCAPACITY OF PERMITTEE, GUARANTORS, OR FINANCIAL INSTITUTIONS

II.J.1. The Permittees shall comply with all the provisions of Utah Admin. Code R315-~~264 140 through 1518-8~~ whenever appropriate.

**MODULE III - WASTE DISPOSAL CELL (WDC)**  
**POST-CLOSURE CARE AND USE OF PROPERTY**

III.A. USE OF PROPERTY

III.A.1. Use of the property is restricted under Utah Admin. Code R315-~~264-110 through 1207-14~~, the deed notation filed with the Duchesne County on February 18, 1993, and the environmental covenant filed with the Duchesne County on January 20, 2010.

III.B. POST-CLOSURE CARE

III.B.1. The Permittees shall conduct all post-closure care activities in accordance with this permit, and in compliance with Utah Admin. Code R315-~~264-110 through 1208-7~~.

III.B.2. The Permittees shall maintain and monitor the WDC, after completion of closure and corrective action activities, in compliance with Utah Admin. Code R315-~~8-11.5264-228~~ and R315-~~8-7264-110 through 120~~ and this permit. The Permittees shall:

III.B.2.a. Maintain the integrity and effectiveness of the final cover in compliance with Utah Admin. Code R315-~~2647-21.4(b)~~ and Attachments 1 and 2 of this permit, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion or other events.

III.B.2.b. Maintain and monitor the groundwater monitoring system in compliance with Utah Admin. Code R315-~~264-2288-11.5(b)(2)~~ and R315-~~264-90 through 1018-6~~ and Module IV and Module V of this permit.

III.B.2.c. Prevent run-on and run-off from eroding or other-wise damaging the final cover in compliance with Utah Admin. Code R315-~~264-3108-14.5(b)(5)~~.

III.B.2.d. Prohibit post-closure use of the property which will disturb the integrity of the final cover, containment systems, or monitoring system in compliance with Utah Admin. Code R315-~~264-110 through 1208-7~~.

III.B.2.e. Protect and maintain surveyed benchmarks used in complying with Utah Admin. Code R315-~~264-3098-14.4~~.

III.C. INSPECTIONS

III.C.1. Inspections shall be conducted during the post-closure care period in compliance with the procedures specified in Condition II.D. and as specified in Attachments 2. All records of inspections and remedial actions shall be submitted to the Director and retained at the Division of Waste Management and Radiation Control~~Solid and Hazardous Waste offices~~, on the 2nd floor of the Multi-Agency State Office Building, 195 North 1950 West, Salt Lake City, Utah throughout the post-closure care period. Any deterioration or malfunction discovered by an inspection shall be remedied as required by Condition II.D and Utah Admin. Code R315-~~264-158-2.6~~(c).

III.D. AMENDMENT OF PLAN

III.D.1. The Permittees shall amend the post-closure plan in accordance with Utah Admin. Code R315-~~264-110 through 1208-7~~ whenever necessary or when required to do so by the Director.

## **MODULE IV - GROUNDWATER MONITORING**

### **IV.A. POST-CLOSURE GROUNDWATER MONITORING**

- IV.A.1. The Permittees shall monitor groundwater in the uppermost aquifer as described in [the Sampling and Analysis Plan \(SAP\) approved by the Director, 2018 Attachment 5](#) and as described below, in a manner that will detect the release of hazardous constituents from the Waste Disposal Cell Area, in compliance with Utah Admin. Code R315-~~264-2288-11.5(b)(2)~~, R315-~~8-7264-110 through 120~~, and R315-~~264-90 through 1018-6~~ during the post-closure care period as defined in Condition IV.B.4.
- IV.A.2. Solid waste management units (SWMUs) ~~shall~~ be subject to provisions of this Module. ~~The SAP and the~~ Corrective action plans developed pursuant to Module VI shall specify which SWMUs shall be subject to some or all of the provisions of this Module. The Permittees must comply with the provisions of Utah Admin. Code R315-~~264-1018-6.12~~.
- IV.A.3. The Permittees shall follow all of the provisions listed under Utah Admin. Code R315-~~8-264-90 through 1016~~, Groundwater Protection, and as defined by the conditions of this permit. For the purposes of this permit, Utah Admin. Code R315-~~264-90 through 1018-6~~ rules for Groundwater Protection shall apply to the Waste Disposal Cell Area.
- IV.A.3.a. The Point of Compliance is a vertical surface located at the hydraulically downgradient boundary of the Waste Disposal Cell. The present compliance point wells are listed in Condition IV.A.4.
- IV.A.4. The Permittees shall maintain a groundwater monitoring system, which consists of monitoring wells, situated hydraulically upgradient and downgradient of the Waste Disposal Cell. Monitoring wells number 7 and 12 shall be considered hydraulically upgradient of the Waste Disposal Cell and shall serve as background monitoring wells; and the hydraulically downgradient monitoring wells will consist of the following wells; 11, 19, 20, and 21 which shall be the compliance point monitoring wells. The monitoring wells and compliance point monitoring well locations are presented in [the SAP Attachment 5](#). The Permittees may add wells as specified in Condition IV.D.1.i.
- IV.B. **REQUIRED PROGRAM**
- IV.B.1. The Permittees shall maintain a groundwater monitoring system as required by Utah Admin. Code R315-~~8-6-8264-97~~.

IV.B.2. The Permittees shall construct and maintain the monitoring wells identified in Condition IV.A.4., in accordance with the detailed plans and specifications presented in [the SAP Permit Attachment 5](#).

IV.B.3. All wells deleted from the monitoring program shall be plugged and abandoned in accordance with procedures to be approved by the Director. Well plugging and abandonment methods and certification shall be submitted to the Director within 60 days from the date the wells are removed from the monitoring program.

IV.B.4. As indicated by Utah Admin. Code R315-~~264-110 through 1208-7~~, the post-closure care period for the Waste Disposal Cell ~~continues as long as the permit is effective is 30 years from the original effective date of this permit (December 18, 1992). The Director may extend the post-closure care period and groundwater monitoring for the hazardous waste management unit with wastes disposed of in place and SWMUs in accordance with R315-264-117(a)(2)(ii) of Utah Admin. Code and Condition IV.A.2.~~ If the groundwater protection standard in Condition IV.C. is exceeded after 30 years, the Permittees shall continue corrective action as specified in Condition V.C.

IV.C. INDICATOR PARAMETERS AND MONITORING CONSTITUENTS

IV.C.1. The Permittees shall monitor wells number 7, 12, 11, 19, 20, and 21, ~~every five years on an annual basis~~, for the parameters and constituents identified in Table IV-1A (General Chemistry parameters) and Table IV-1B (Metals), pursuant to the sampling and analysis plan presented in [the SAP Attachment 5](#).

~~The Permittees shall monitor wells number 7, 12, 11, 19, 20, and 21 on an annual basis for the parameters and constituents identified in Table IV-1C (Volatile Organics).~~

~~IV.C.2. Permittees shall provide the list of all organic analyte by USEPA Methods in the original laboratory reports.~~

Table IV-1A GROUNDWATER MONITORING PARAMETERS AND CONSTITUENTS

Parameter or Constituent	Test Method	Concentrations Limit *†
<u>General</u>		
Calcium	6010C	
Magnesium	6010C	
Potassium	6010C	
Sodium	6010C	
Cyanide	9012	

Pennzoil – Quaker State Company  
d.b.a SOPUS Products  
Post-Closure Permit  
Issued: September 30, 2014  
Modified: March 2019

Sulfate	9056.A
Carbonate	SM2320B-2011
Bicarbonate	SM2320B-2011
Chloride	9056A
Alkalinity	SM2320B-2011
Nitrate + Nitrite as N	353.2
Fluoride	9056.A
Sulfide	376.2
pH	9040C
Specific Conductance	SM2510B-2011
Total Dissolved Solids	160.1 or SM 2540C-2011
Oil and Grease	1664

Table IV-1B METALS

Antimony	6010C
Arsenic	6010C
Barium	6010C
Beryllium	6010C
Cadmium	6010C
Chromium	6010C
Cobalt	6010C
Copper	6010C
Lead	6010C
Mercury	7470A
Nickel	6010C
Selenium	6010C
Silver	6010C
Thallium	6010C
Vanadium	6010C
Zinc	6010C

Table IV-1C VOLATILE ORGANICS

Benzene	8260B	5
Carbon disulfide	8260B	5
Chlorobenzene	8260B	5
Chloroform	8260B	5
1,2-Dibromoethane	8260B	5
1,2-Dichloroethane	8260B	5
1,4-Dioxane	8260B	500
Methylene chloride	8260B	5
Methyl ethyl ketone	8260B	20
Styrene	8260B	5
Ethyl benzene	8260B	5

Pennzoil – Quaker State Company  
d.b.a SOPUS Products  
Post-Closure Permit  
Issued: September 30, 2014  
Modified: March 2019

Toluene	8260B	5
Xylenes <sup>†</sup>	8260B	5

<sup>†</sup> - Reported as ug/L unless noted.

<sup>‡</sup> - Reported as ortho-, meta-, and para- isomers

\*- Background levels to be established in accordance with Module IV.C.3

**Comment [HZ1]:** Please update the table with current analytical method. The reporting limits should be included in SAP.

IV.C.2. A request for a substitution of an analytical method which is equivalent to the method specifically approved for use in this permit shall be submitted to the Director in accordance with Condition I.D.2. The request shall provide information demonstrating that the proposed method requested to be substituted is equivalent or superior in terms of sensitivity, accuracy, and precision (i.e., reproducibility).

IV.C.3. For those parameters and constituents in Table IV-1 for which no concentration limit is established at the time the Permit is issued (general parameters and metals), the Permittees shall establish background values in accordance with the following procedures:

IV.C.3.a. Background groundwater quality for a monitoring parameter or constituent shall be based on data from annual sampling of the well (or wells) upgradient from the waste management unit for one (1) year and annually thereafter [Utah Admin. Code R315-~~264-978-6.8~~(g)(1)].

IV.C.3.b. The Permittees shall take a minimum of one sample from each well and a minimum of four samples from the entire system used to determine background groundwater quality for each parameter and/or constituent each time the system is sampled [Utah Admin. Code R315-~~264-978-6.8~~(g)(4)].

~~IV.C.4. The Permittees shall monitor the facility-wide SWMU wells for the parameters and constituents specified in the SAP.~~

~~IV.C.5. The Permittees may request to revise the SAP for approval by the Director without a permit modification.~~

IV.D. GROUNDWATER MONITORING REQUIREMENTS

IV.D.1. The Permittees shall comply with the following general requirements for groundwater monitoring:

IV.D.1.a. The groundwater monitoring system shall consist of the wells specified in Condition IV.A.4.

IV.D.1.b. All monitoring wells shall be constructed in accordance with the provisions in Utah Admin. Code R315-~~264-978-6.8~~(c) and Condition IV.D.2.

- IV.D.1.c. The groundwater monitoring program shall include sampling and analysis procedures detailed in the SAP ~~in accordance with~~ Utah Admin. Code R315-~~264-978-6.8~~(d) and (e).
- IV.D.1.d. The Permittees shall follow the requirements for measurement of the groundwater surface elevation for the WDC wells and facility-wide SWMU wells presented in the SAP in accordance with ~~of~~ Utah Admin. Code R315-~~264-978-6.8~~(f).
- IV.D.1.e. If the Director receives information indicating that the surveyed well apron elevations of the wells in the groundwater system(s) as specified in Condition IV.C. or the groundwater monitoring system as specified in Conditions IV.A.4. and the SAP Attachment 5, are inadequate, the Director shall require the Permittees to resurvey any or all of these well apron elevations.
- IV.D.1.f. The Permittees shall notify the Director in writing at least ten (10) working days prior to any sampling event required under this permit.
- IV.D.1.g. The Permittees may add new wells as part of the monitoring well system only upon approval or request of the Director. Approval for changes to the WDC monitoring well system shall constitute a permit modification. The Permittees shall follow the procedures specified in Condition I.D.2. for modification of the permit. Changes to the facility-wide SMWU monitoring well system may be approved by the Director without a permit modification.
- IV.D.1.i. The Permittees must at all times maintain a monitoring well system as specified in Condition IV.D.1.a. The compliance point wells listed in Condition IV.A.4. may not be removed from the monitoring well system before the Permittees receives the Director's approval of a permit modification, in accordance with Utah Admin. Code R315-~~270-423-4.3~~.
- IV.D.1.j. The Permittees shall provide for the proper disposal of contaminated groundwater generated during groundwater monitoring well sampling and during the development of new monitoring wells.
- IV.D.1.k. The Permittees shall monitor and sample all groundwater wells for the presence of hazardous and other constituents identified in Condition IV.C. The wells shall be sampled as specified in Condition IV.C. and IV.F.2.
- IV.D.1.l. The Permittees shall locate, install, construct, and maintain new groundwater monitoring wells as specified below:
- IV.D.2.a. Well construction shall follow the techniques described in the Technical Enforcement Guidance Document (TEGD), OSWER-9950.1, September 1986. All monitoring wells shall be cased in a manner that maintains the

integrity of the monitoring well bore hole. This casing shall be screened or perforated and packed with gravel or sand where necessary, to enable collection of groundwater samples. The annular space, the space between the bore hole and well casing above the sampling depth, must be sealed to prevent contamination of samples and the groundwater.

- IV.D.2.b. The Permittees shall construct and maintain new monitoring wells in accordance with plans and specifications to be submitted to the Director for approval. The Permittees shall follow the procedures specified in Condition I.D.2. for permit modifications.
- IV.D.2.c. Additional groundwater monitoring wells shall be installed to maintain compliance if subsurface conditions significantly change after permit issuance. Such changes may include, but are not limited to, water level elevation or apparent flow direction changes, or detection of one of the hazardous constituents in a monitoring well. If hazardous waste constituents exceeding the groundwater protection standard concentration limits, as defined in Condition IV.C. of this Module, are detected in the furthestmost hydraulically downgradient monitoring well(s), the Permittees shall install additional groundwater monitoring wells further downgradient.
- IV.D.2.d. Upon notification by the Director in writing or as a result of a compliance action, the Permittees may be required to install and sample additional wells at any time during the post-closure or compliance periods if new information or unforeseen circumstances reveal a need for additional monitoring to protect human health and the environment.
- IV.D.2.e. The Permittees shall submit monitoring well completion reports which include boring logs, sieve analysis (grain size), standard penetration tests, analytical tests performed on soils (Atterberg limits, etc.), water level elevations, groundwater contour maps, well development results including recharge rates, cross sections or fence diagrams as well as all other data, within ninety (90) days after completion of the wells which are installed after permit issuance.
- IV.D.2.f. Existing monitoring wells shall be maintained in a fully operational condition for the duration of this permit. The Permittees shall notify the Director within fourteen (14) seven (7) days when a well is no longer properly functioning (including the presence of sandy or silty materials, and cracked or broken casings). The Director shall approve the conditions for replacement or correction of improperly operating wells. Replacement of an existing well that has been damaged or rendered inoperable, without change to location, design, or depth of the well, shall constitute a permit modification under Condition I.D.

- IV.D.2.g. The Permittees shall, on an annual basis, measure the depth to the bottom of all WDC groundwater monitoring wells to the nearest 0.01 feet. The Permittees shall, on a five-year basis, measure the depth to the bottom of all SWMU groundwater monitoring wells to the nearest 0.01 feet. This information shall be recorded on well purging volume calculation sheets. If a problem is observed, the Permittees shall follow the procedures described above in Condition IV.D.2.f. regarding notification and corrective procedures.
- IV.D.2.h. The Director shall approve the permanent removal of any WDC wells listed in Condition IV.A.4 and the SAP Attachment 5, or any WDC wells installed after permit issuance. A request for the removal of wells shall constitute a Class 2 permit modification.
- IV.D.2.i. The Permittees shall permanently remove wells from the monitoring well system in accordance with the plugging and abandonment procedures outlined in Utah Administrative Rules for water well drillers, R655-4-12 of Utah Admin. Code.
- IV.D.2.j. The Permittees shall provide for the proper disposal of groundwater generated during the development of any newly installed monitor wells.
- IV.D.3. The Permittees must include and maintain consistent sampling and analysis procedures in the groundwater monitoring program that are designed to ensure reliable monitoring results of groundwater quality below the Waste Disposal Cell and facility-wide groundwater contamination. As required by Utah Admin. Code R315-~~264-978-6.8~~(d), the program shall include procedures and techniques for:
- IV.D.3.a. sample collection;
  - IV.D.3.b. sample preservation and shipment;
  - IV.D.3.c. analytical procedures;
  - IV.D.3.d. chain-of-custody control; and
  - IV.D.3.e. quality assurance and quality control.
- IV.D.4. The sampling and analytical methods shall be appropriate for groundwater sampling and accurately measure hazardous waste constituents in groundwater samples, as required by Utah Admin. Code R315-~~264-978-6.8~~(e).
- IV.D.5. The Permittees shall use the following techniques and procedures when obtaining samples and analyzing samples from the groundwater monitoring

wells and for obtaining and analyzing water samples from the Waste Disposal Cell:

- IV.D.5.a. Samples from all wells shall be collected in the order and by the techniques described in the approved Sampling Plan, located in [the SAP Attachment 5](#).
- IV.D.5.b. All samples shall be preserved and transported in accordance with the procedures specified in the approved Sampling Plan of [the SAP Attachment 5](#).
- IV.D.5.c. All changes to the sampling and analysis procedures specified in [the SAP Attachment 5](#) shall constitute a permit modification following the procedures of Condition I.D.
- IV.D.5.d. All samples shall be analyzed according to test methods delineated in Condition IV.C. or an equivalent EPA-approved method that has been pre-approved by the Director in accordance with Permit Condition I.F.13.b. In addition:
  - IV.D.5.d.i. All major peaks greater than 25% of the peak height of the closest internal standard shall be identified. The quantity of these compounds shall be estimated and reported based upon the closest internal standard.
  - IV.D.5.d.ii. Any major peak found during the analysis may become a target parameter.
  - IV.D.5.d.iii. For each annual sampling event under the groundwater monitoring program, the use of quality control sample data shall be explained in full detail in the Sampling Plan and in the [Annual Groundwater Monitoring and Site Management Reports \(formerly Corrective Action Progress Reports\) annual reports](#). The Permittees shall collect and analyze for each day of sampling, at least one (1) field blank and, one (1) set of replicates representing, at a minimum, 10% of the total number of samples. The laboratory shall provide method blanks, spikes, and duplicates. If non-dedicated sampling equipment is used, the Permittees shall collect and analyze one decontamination blank for analysis at each daily sampling event. The Permittees shall reject data from any field, decontamination, or laboratory blanks exceeding three times the method detection limit for any organic parameter. The Permittees shall resample all wells from which data has not been validated. Qualifiers as defined by the EPA Contract Lab Program (CLP), shall be indicated on all organic laboratory reports when blanks indicate contamination above the method detection level.
  - IV.D.5.d.iv. The Director may request at any time all laboratory QA/QC documentation and supporting data on any sampling episode. The raw organics information for required sampling and analysis, including organics gas chromatographic

printouts, mass spectral analyses, and QA/QC surrogate and spiking results shall be provided by the Permittees, upon request throughout the post-closure care period.

IV.D.5.d.v. All samples shall be tracked and controlled using the chain-of-custody procedures specified in the SAP Sampling Plan and as indicated in Attachment 5.

IV.D.5.d.vi. In case of loss of sample integrity (i.e., breakage, loss), resampling shall take place within fourteen (14) seven (7) days of notification of the loss.

IV.D.6. The Permittees shall determine the elevation of the groundwater surface at each well each time the groundwater is sampled, in accordance with Condition IV.D.1.d [Utah Admin. Code R315-~~264-978-6.8~~(f)].

IV.D.7. The Permittees shall record the surveyed elevation of the monitoring well(s) IV.E when installed (with as-built drawings).

#### IV.E. STATISTICAL PROCEDURES

IV.E.1. The Permittees shall follow the procedures and performance standards specified in Attachment 67. The statistical test outlined in Attachment 67 shall be conducted for each hazardous constituent in each well. Where the practical quantification limits (PQLs) are used in any of statistical procedures contained in Utah Admin. Code R315-~~264-978-6.8~~(h), the PQLs shall be proposed by the Permittees and approved by the Director. The statistical method chosen under Utah Admin. Code R315-~~264-978-6.8~~(h) for approval shall comply with the performance standards in Attachment 67.

IV.E.2. If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

IV.E.3. If the statistical method described in Attachment 67 indicates that an exceedance has occurred, the out of control condition should be verified in the next round of sampling before further action is initiated. If the exceedance is verified, then Condition IV.G will apply.

#### IV.F. MONITORING PROGRAM AND DATA EVALUATION

IV.F.1. The Permittees shall collect, preserve, and analyze samples pursuant to Condition IV.D.3.

- IV.F.2. The Permittees shall determine groundwater quality at each monitoring well at the compliance point annually during the post-closure period of the Waste Disposal Cell in accordance with ~~Utah Admin. Code R315-264-648-6.9(d).~~ The Permittees shall express the groundwater quality at each monitoring well in a form necessary for the determination of statistically significant increases (i.e., means and variances).
- IV.F.3. The Permittees shall determine the groundwater gradient and direction in the uppermost aquifer at least annually. This information shall be included in the September 30th ~~July 28th~~ annual report specified by Condition IV.H.3.
- IV.F.4. The Permittees shall determine whether there is a statistically significant increase over the background values for each parameter identified in Condition IV.C. each time groundwater quality is determined at the compliance point. In determining whether such an increase has occurred, the Permittees shall compare the groundwater quality at each monitoring well specified in Condition IV.A.4. to the background value specified in Condition IV.C., in accordance with the statistical procedures specified in Attachment 67.
- IV.F.5. The Permittees shall perform the evaluations described in Condition IV.F.4. within ninety (90) days after completion of sampling.

IV.G. SPECIAL REQUIREMENTS IF SIGNIFICANT INCREASES OCCUR IN  
VALUES FOR PARAMETERS OR CONSTITUENTS

- IV.G.1. If the Permittees determines, pursuant to Condition IV.F., that there is a statistically significant increase above the background values for any of the indicator parameters specified in Condition IV.C., the Permittees shall:
- IV.G.1.a. Notify the Director in writing within fourteen (14) seven days.
- IV.G.1.b. Immediately sample the groundwater in all wells and determine the concentration of all constituents identified in Utah Admin. Code R315-50-14, Appendix IX (Appendix IX of 40 CFR 264).
- IV.G.1.c. Establish the background values for each Appendix IX constituent found in the groundwater.
- IV.G.1.d. Within 90 days, submit to the Director an application for a permit modification to establish a compliance monitoring program that includes the following information:
- IV.G.1.d.i. An identification of the concentration of each Appendix IX constituent found in the groundwater at each monitoring well at the compliance point.
- IV.G.1.d.ii. Any proposed changes to the groundwater monitoring system at the facility necessary to meet the requirements of compliance monitoring as described in Utah Admin. Code R315-264-998-6-10.
- IV.G.1.d.iii. Any proposed changes to the monitoring frequency, sampling and analysis procedures, or methods or statistical procedures used at the facility necessary to meet the requirements of compliance monitoring as described in Utah Admin. Code R315-264-998-6-10.
- IV.G.1.d.iv. For each hazardous constituent found at the compliance point, a proposed concentration limit, or a notice of intent to seek an alternate concentration limit for a hazardous constituent.
- IV.G.2. Within 180 days of the submission of alternate concentration limits for the hazardous constituents, the Permittees shall submit all data to support the alternate concentration limit proposed and a corrective action feasibility plan that meets the requirements of Module V.
- IV.G.β. If the Permittees determines, pursuant to Condition IV.F., there is a statistically significant increase above the background values for the parameters specified in Condition IV.C., he may demonstrate that a source other than a regulated unit caused the increase or that the increase resulted

from an error in sampling, analysis, or evaluation. In such cases, the Permittees shall:

- IV.G.β.a. Notify the Director in writing within fourteen (14) ~~seven (7)~~ days that he intends to make a demonstration.
- IV.G.3.b. Within 90 days, submit a report to the Director which demonstrates that a source other than a regulated unit caused the increase, or that the increase resulted from an error in sampling, analysis, or evaluation.
- IV.G.3.c. Within 90 days, submit to the Director an application for a permit modification to make any appropriate changes to the detection monitoring program at the facility.
- IV.G.3.d. Continue to monitor in accordance with the detection monitoring program at the facility.

IV.H. RECORDKEEPING AND REPORTING

- IV.H.1. The Permittees shall include all monitoring, testing, and analytical data obtained in accordance with Condition IV.D. in the annual monitoring report submitted to the Director. The data must include all computations, calculated means, variances, and results of all statistical tests required by Condition IV.E.
- IV.H.2. The established background values and the computations necessary to determine background values shall be submitted to the Director.
- IV.H.β. The Permittees shall submit the analytical results required by Conditions IV.D.3. and IV.D.4. and the results of statistical analyses required by Condition IV.E. and IV.F. in an Annual Groundwater Monitoring and Site Management Report by September 30th ~~July 28th~~ following the sampling event.

IV.I. REQUEST FOR PERMIT MODIFICATION

- IV.I.1. If the Permittees or the Director determines that the detection monitoring program no longer satisfies the requirements of the regulations, the Permittees shall, within 90 days of the determination, submit an application for a permit modification to make any appropriate changes to the program which will satisfy the regulations.

## MODULE V - GROUNDWATER CORRECTIVE ACTION

### V.A. CORRECTIVE ACTION PLAN

V.A.1. The Permittees shall submit a Corrective Action Plan (CAP) for any contamination associated with the Waste Disposal Cell (WDC) within 180 days of the notification to the Director as per Condition IV.G.1. Upon submittal of the CAP, the Director will review the plan and either approve or disapprove the CAP. If the CAP is not approved, Pennzoil – Quaker State Company will provide corrective solutions to the CAP deficiencies specified in writing by the Director within 90 days of the written notification.

### V.B. CORRECTIVE ACTION IMPLEMENTATION

V.B.1. Upon approval of the CAP by the Director, the Permittees shall implement the CAP.

### V.C. DURATION OF CORRECTIVE ACTION PROGRAM

The Permittees shall continue to implement the CAP during the compliance period to the extent necessary to ensure that the groundwater protection standard is not exceeded. If the Permittees is conducting corrective action at the end of the compliance period, he shall continue that corrective action for as long as necessary to achieve compliance with the groundwater protection standard. The Permittee may terminate the CAP if the Permittees can demonstrate, with Director's approval-concurrence, based on data from the groundwater monitoring program under Module IV, that the ~~groundwater protection standard has not been exceeded for a period of three consecutive years; the corrective action objectives have been meet in R315-101-6 of Utah Admin. Code.~~

**MODULE VI**  
**CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS**

- VI.A. SOLID WASTE MANAGEMENT UNITS
- VI.A.1. The Permittees shall conduct a corrective action investigation, in accordance with Module VI, for each Solid Waste Management Unit (SWMU) specified in the Pennzoil RCRA Facility Assessment (RFA) Summary List (Attachment 56).
- VI.A.2. The Director may append additional Solid Waste Management Units to those in Pennzoil's Summary List (Attachment 56), in accordance with Utah Admin. Code R315-~~270-41 3-4.2.~~, based on additional information received by the ~~Permittee~~ Permittees or the Director.
- VI.B. STANDARD CONDITIONS
- VI.B.1. Failure to submit the information required by Module VI or falsification of any submitted information is grounds for termination of this permit in accordance with Utah Admin. Code R315-~~270-433-4.4.~~
- VI.B.2. The Permittees shall sign and certify all plans, reports, notifications, and other submissions to the Director in accordance with Condition I.G.
- VI.B.3. The Permittees shall submit a paper copy and an electronic copy of each plan, report, notification, or other submissions required by Module VI to the Director.
- VI.B.4. Upon written approval from the Director, all plans and schedules required by the conditions in Module VI, shall be incorporated into Module VI of this permit in accordance with Condition VI.I. Any noncompliance with such approved plans and schedules shall be deemed noncompliance with this permit.
- VI.B.5. Upon written approval from the Director in accordance with Condition VI.I., the Permittees shall receive extension(s) of the specified compliance schedule due date(s) for the submittal(s) required by Module VI.
- VI.B.6. If the Director determines that further actions beyond those required by Module VI are warranted, the Permittees shall modify Module VI in accordance with Condition VI.I. to provide for those actions.

- VI.B.7. All raw data, such as laboratory reports, drilling logs, bench-scale or pilot-scale data, and other supporting information gathered or generated during activities undertaken pursuant to Module VI shall be maintained at a location proposed by the Permittees during the effective term of this permit.
- VI.C. RCRA FACILITY INVESTIGATION
- VI.C.1. The Permittees shall conduct a RCRA Facility Investigation (RFI) to determine the nature and extent of known and suspected releases of hazardous wastes and/or hazardous waste constituent(s) from each Solid Waste Management Unit (SWMU) at the Facility and to gather data to support the Corrective Action Plan. The Permittees shall conduct the RFI in accordance with the approved workplan required by Condition VI.C.2.
- VI.C.2. The Permittees shall prepare and submit a RFI Workplan for review and approval by the Director.
- VI.C.3. The Permittees shall conduct the RFI for the Solid Waste Management Units contained in Pennzoil's RFA Summary List (Attachment 56), in accordance with the schedule specified in Table VI-1.
- VI.C.4. The RFI Workplan required by Condition VI.C.2 shall include the following plans, designated as Task II:
- VI.C.4.a. Project management plan describing the technical approach to the investigation, schedules, milestone reports and personnel;
- VI.C.4.b. Data Collection Quality Assurance Plan to establish and document all monitoring procedures;
- VI.C.4.c. Data Management Plan to track investigation data and results;
- VI.C.4.d. Health and Safety Plan for safe conduct of corrective action activities; and
- VI.C.4.e. Community Relations Plan for public dissemination of information.
- VI.C.5. The RFI Workplan required by Condition VI.C.2. shall provide for the following, designated as Task III.:
- VI.C.5.a. Characterization of the environmental setting at the Former Pennzoil Roosevelt Refinery, including the hydrogeology, soils, surface water, sediment, and air;

- VI.C.5.b. Source characterization of all waste management units at the Former Pennzoil Roosevelt Refinery, including the nature of the unit and the type of waste placed in the unit as described by chemical and physical characteristics;
- VI.C.5.c. Contamination characterization, including analysis of hazardous waste and hazardous waste constituents from Solid Waste Management Units and the effects of such hazardous waste and hazardous waste constituents on groundwater, soils, surface water, sediment, air, subsurface gases; and
- VI.C.5.d. Potential receptor identification describing the potential for human and environmental impact from contaminant exposure from the facility;
- VI.C.6. The RFI Workplan required by Condition VI.C.2 shall include an RFI Report of all facility investigations, designated as Task IV. The objective of this task is to ensure that the investigation data are sufficient in quality and quantity to describe the nature and extent of contamination, potential threat to human health and the environment, and to develop a Corrective Action Plan. This RFI Report shall include:
  - VI.C.6.a. Data analysis of the type and extent of contamination at each SWMU including sources and migration pathways;
  - VI.C.6.b. Protection standards for groundwater, soil, or other relevant protection standards.
- VI.C.7. The RFI compliance schedules specified in Table VI-1, shall be modified in accordance with Condition VI.I.

VI.D. INTERIM MEASURES

- VI.D.1. If, during the course of any activity initiated in compliance with the permit conditions of Module VI of this permit, the Director or the Permittee determines that a release or potential release of hazardous waste and/or hazardous waste constituent(s) from a Solid Waste Management Unit poses a threat to human health and the environment, the Permittees may be required to perform specific interim measures.
- VI.D.2. The Director shall notify the Permittees in writing of the requirement to perform the interim measures in accordance with Condition VI.D.1.
- VI.D.3. Within 30 calendar days after receiving the written notification requiring the Interim Measures Plan as specified in VI.D.2., the Permittees shall provide the Interim Measures Plan to the Director for review and approval. The Interim Measures Plan shall identify specific action(s) to be taken to implement the

interim measures and a schedule for implementing the required measures. The Interim Measures Plan shall be incorporated into this permit. The Interim Measures Plan shall include, but not be limited to, the following:

- VI.D.3.a. A statement of the objectives of the interim measure explaining how the interim measure will mitigate a potential threat to human health (health and safety requirements) and the environment, is consistent with and integrated into any long term solution at Former Pennzoil Roosevelt Refinery, or both;
- VI.D.3.b. Data collection quality assurance and data management information;
- VI.D.3.c. Design plans and specifications, construction requirements, operation and maintenance requirements, project schedules, and final design documents;
- VI.D.3.d. Construction quality assurance objectives, inspection activities, sampling requirements, and documentation; and
- VI.D.3.e. Schedule for submittal of the following reports; progress reports, interim measures workplan, final design documents, draft interim measures report, and final interim measures report.
- VI.D.4. The Permittee~~s~~ may initiate interim measures in accordance with Conditions VI.D.5 and VI.D.6
- VI.D.5. In determining whether an interim measure is required, the Director shall consider the following:
  - VI.D.5.a. Time required to develop and implement a final remedy;
  - VI.D.5.b. Actual and potential exposure of human and environmental receptors;
  - VI.D.5.c. Actual and potential contamination of drinking water supplies and sensitive ecosystems;
  - VI.D.5.d. The potential for further degradation of the medium absent interim measures;
  - VI.D.5.e. Presence of hazardous waste in containers that may pose a threat of release;
  - VI.D.5.f. Presence and concentration of hazardous waste in soils, including hazardous waste constituent(s), that have the potential to migrate to groundwater or surface water;
  - VI.D.5.g. Weather conditions that may affect the current levels of contamination;

- VI.D.5.h. Risks of fire, explosion, or accident; and
- VI.D.5.i. Other situations that may pose threats to human health and the environment.
- VI.E. NOTIFICATION REQUIREMENTS FOR AND ASSESSMENT OF NEWLY IDENTIFIED SOLID WASTE MANAGEMENT UNITS
- VI.E.1. The Permittee~~s~~ shall notify the Director in writing, of any newly identified SWMU(s) not identified in Condition VI.A., within 30 calendar days of discovering the SWMU(s). The notification shall include the location of the new SWMU(s) and information on the suspected or known wastes at the site.
- VI.E.2. Within 150 calendar days following discovery of the SWMU(s), the Permittee~~s~~ shall submit a SWMU Assessment Plan to the Director for review and approval.
- VI.E.3. The SWMU Assessment Plan shall include:
- VI.E.3.a. A description of past and present operations at the unit(s); and
- VI.E.3.b. Any groundwater, surface water, soil (surface or subsurface strata), or air sampling and analysis data needed to determine whether a release of hazardous waste or hazardous waste constituents from such units has occurred. The SWMU Assessment Plan shall demonstrate that the sampling and analysis program, if applicable, is capable of yielding representative samples and shall include parameters sufficient to identify migration of hazardous waste and hazardous waste constituents from the newly discovered SWMU(s) to the environment.
- VI.E.4. If the Director does not approve of the SWMU Assessment Plan, he shall provide a written notice to the Permittee~~s~~ of the Plan's deficiencies. The written notice will specify a due date for submittal of a revised assessment plan.
- VI.E.5. Upon approval by the Director, the SWMU Assessment Plan, shall be incorporated into this Permit in accordance with Condition VI.I.
- VI.E.6. The Permittee~~s~~ shall implement the approved SWMU Assessment Plan within 30 calendar days of approval.
- VI.E.7. Within 30 days of completion of the SWMU Assessment Plan, the Permittee~~s~~ shall submit a SWMU Assessment Report to the Director.

- VI.E.8. The SWMU Assessment Report shall describe all results obtained from the implementation of the approved SWMU Assessment Plan. For each newly listed SWMU, the Report shall provide:
- VI.E.8.a. The SWMU location, identified on a map;
  - VI.E.8.b. The type and function of the SWMU, including general dimensions and a structural description;
  - VI.E.8.c. The period during which the SWMU was operated; and
  - VI.E.8.d. A list of all wastes managed at the SWMU and results of all sampling and analysis used to determine whether releases of hazardous wastes and hazardous waste constituents have occurred, are occurring, or are likely to occur from the unit.
- VI.E.9. Based on the results of SWMU Report, the Director shall determine the need for further investigations at specific unit(s) included in the SWMU Assessment. If the Director determines that such investigations are needed, the Director shall require the Permittees to prepare a plan for such investigations. This plan shall be reviewed for approval in accordance with the RFI Workplan under Condition VI.C.
- VI.E.10. Within fifteen (15) days of discovery, the Permittees shall notify the Director in writing of any release(s) of hazardous waste and hazardous waste constituents discovered during the course of groundwater monitoring, field investigation, environmental auditing, or other activities undertaken during the RFI. Such releases may be from already documented or newly identified SWMUs. The Director shall require further investigation of the new releases. A plan for such investigation will be reviewed for approval by the Director.
- VI.F. CORRECTIVE ACTION PLAN
- VI.F.1. Based on the results of the RFI, the Permittees shall submit to the Director, for review and approval, a Corrective Action Plan (CAP) for all SWMUs that have been identified to have had a release of hazardous waste and hazardous waste constituents. The purpose of the CAP is to develop and evaluate corrective action alternatives and to outline one or more alternate corrective measures which will satisfy the target cleanup objectives.  
The CAP shall include:
- VI.F.1.a. Target cleanup objectives;
  - VI.F.1.b. Corrective action(s) which shall satisfy target cleanup objectives;

- VI.F1.c. Summary of all corrective measure alternatives examined for the CAP; and
- VI.F.1.d. Schedule for implementation of the corrective action(s) according to the time frame and schedule of this Permit.
- VI.F.2. The Permittees shall submit the CAP in accordance with the schedule specified in Table VI-2.
- VI.F.3. The Director will approve, or disapprove and provide comments to the Permittees, as to the corrections or modifications needed to the CAP.
- VI.F.4. Upon receipt of comments, the Permittees shall submit a new CAP for the Director's approval.
- VI.F.5. The Director shall consider performance, reliability, implementability, safety, human health, and the environmental impact of the measure(s) in approving the CAP.
- VI.F.6. Upon approval of the CAP, the Permittees shall implement the corrective action(s) according to the schedule as approved in the CAP. The approved schedule for the CAP shall be incorporated in Table VI-2, Corrective Action Compliance Schedule.
- VI.F.7. The Permittees shall furnish or retain all personnel, materials, and services necessary for the implementation of the CAP.
- VI.G. DETERMINATION OF NO FURTHER ACTIONS
- VI.G.1. The Permittees may petition the Director to terminate the schedule of compliance for Corrective Action of SWMUs (Module VI) as a Class 3 permit modification in accordance with Condition I.D.2.
- VI.G.2. The Permittees may petition the Director for a no further action determination for a SWMU that meets the requirements of R315-101-6(c)(1) of Utah Admin. Code. The ~~petition shall~~ petition shall contain information based on the RCRA Facility Investigation demonstrating that there are no releases of hazardous waste or hazardous waste constituent(s) that pose a threat to human health or the environment from SWMUs at the Former Pennzoil Roosevelt Refinery, Duchesne County, Utah.
- VI.G.3. A determination of no further action, in accordance with Condition VI.G.1, shall not preclude the Director from requiring further investigations, studies, or remediation at a later date if new information or subsequent analysis indicates

a release or potential of a release from a SWMU at the Former Pennzoil Roosevelt Refinery, Duchesne County, Utah. In such a case, the Director shall initiate either a modification to the Corrective Action Schedule of Compliance (Module VI) in accordance with Condition I.D. or rescind the determination of VI.G.1.

VI.H. REPORTING REQUIREMENTS

VI.H.1. The Permittees shall submit to the Director written semi-annual progress reports of all activities conducted pursuant to Tables VI-1 and VI-2 of Module VI.

VI.H.2. The semiannual progress reports shall contain:

VI.H.2.a. A description of the work completed;

VI.H.2.b. Summaries of all findings and all raw data;

VI.H.2.c. Summaries of all problems encountered during the reporting period and actions taken or to be taken to rectify problems; and

VI.H.2.d. Projected work for the next reporting period.

VI.H.3. The Permittees shall maintain copies of other reports, drilling logs, and data at a local repository proposed by the Permittees during the effective period of this permit. The Permittees shall provide copies of the said reports, logs, and data to the Director upon request.

VI.H.4. As specified under Condition VI.B.6., the Director may require the Permittees to conduct new or more extensive assessments, investigations, or studies, as needed, based on information provided in these progress reports or other supporting information.

VI.I. MODIFICATION OF THE CORRECTIVE ACTION SCHEDULE OF COMPLIANCE (MODULE VI)

VI.I.1. A request for modifications of the final compliance dates pursuant to the permit conditions in Module VI shall be submitted to the Director for approval, in accordance with Condition I.D.1. Final compliance dates in the Corrective Action Schedule of Compliance include:

VI.I.1.a. The compliance date(s), as specified in Table VI-1, for submittal of the RCRA Facility Investigation Final Report (Task IV);

- VI.I.1.b. The compliance date(s), as specified in Table VI-2, for submittal of the final Corrective Action Plan, in accordance with Condition VI.F.2.;
- VI.I.1.c. Compliance dates specified in Table VI-2, for implementing the approved plans and reports; and
- VI.I.1.d. Compliance dates for quarterly submittal of progress reports.

**TABLE VI-1**

**RCRA Facility Investigation Compliance Schedule**

The Permittees shall perform the activities as outlined below:

	<u>Activity</u>	<u>Date Submitted or Due Date</u>
1.	Submit Task I - Current conditions report	Current Conditions Report - June 14, 1993
2.	Submit Draft Task II – RFI workplan and Task III schedule of Activities	Phase I RFI Work Plan - November 17, 1995. Addendum Phase I RFI Work Plan – July 31, 2000
3.	Begin Task II - RFI workplan and Task III - Facility Investigation	Phase I RFI began in July 1996 Addendum Phase I RFI began in April 2001
4.	Submit Task IV – Investigation Analysis	RFI Phase I Report submitted April 7, 1997 Addendum Phase I RFI Report submitted June 14, 2002
5.	Progress Reports on Task I through IV	Semi-annually, starting 180 calendar days after approval of RFI Work Plan, until completion of all RFI work.
6.	Submit Tasks II and III Final and Summary reports	RFI Phase I Report submitted April 7, 1997 Addendum Phase I RFI Report submitted June 14, 2002

Pennzoil – Quaker State Company  
d.b.a SOPUS Products  
Post Closure Permit  
Issued: ~~September 30, 2018~~ ~~October xx30,~~  
~~2014~~ September 30, 2014  
Modified: March 2019

7

Submit RFI Report

Final RFI Report submitted October 19, 2007

8

Submit CAP

CAP submitted June 2009

**TABLE VI-2**

**Corrective Action Compliance Schedule**

The Permittees shall prepare reports for the Corrective Action Plan as described below presenting the results of the CAP.

	<u>Facility Submission</u>	<u>Due Date</u>
1.	Draft Corrective Action Plan (CAP).	Within 180 days of the Director’s approval of the RFI Report.
2.	Final CAP.	Within sixty (60) days of receiving the Director’s comments.
3.	CAP Construction and Implementation reports.	As specified in CAP as approved of by the Director.
4.	Draft CQA (Construction Quality Assurance) program plan.	Prior to construction.
5.	Final CQA (Construction Quality Assurance) program plan.	Within sixty (60) days of the Director’s approval of draft CQA plan.
6.	Construction of corrective measures.	As approved in final CAP.
7.	Corrective measure construction report.	Ninety (90) days following completion of construction.
8.	Progress Reports.	Semi-annually; starting 180 calendar days after the approval of the CAP, until a Site Management Plan or a No Further Action Designation is approved by the Director.

## ATTACHMENT 1: SECURITY

### 1.0 COMPANY CONTACT

**Pennzoil - Quaker State Company** d.b.a. SPOUS Products will remain responsible for post-closure care of the wastewater treatment ponds (Waste Disposal Cell). The Permittee contact during the post-closure period shall be:

Mr. Dan Kirk (Principal Program Manager)  
~~Shell Oil Products US (SOPUS)~~Pennzoil-Quaker State Company,  
Dba SOPUS Products  
~~Soil and Groundwater Focus Delivery Group, Major Projects TSP 2155 B~~  
Shell777 Walker Street  
150 N. Dairy Ashford  
Building A 5<sup>th</sup> Floor  
Houston, TX ~~77002~~77079  
Telephone: ~~(832) 337-8276~~ ~~(713) 241-7140~~

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John H. Wells  
Roosevelt Land Investment, LLC  
465 South 200 West  
Bountiful, Utah 84010  
Telephone: (801) 292-3800 – office  
801-230-7220 – cell  
(435) 823-5326 – alternate contact Paul Wells

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A copy of the post-closure plan and the appropriate monitoring records will be maintained in Houston, Texas and at the Division of ~~Waste Management and Radiation Control~~Solid and Hazardous Waste on the 2nd floor of the Multi-Agency State Office Building, 195 North 1950 West, Salt Lake City. Should changes in personnel require a change in the company contact, the Division will be so notified and the permit modified pursuant to Condition I.D.

### 2.0 SECURITY

Access to the Waste Disposal Cell is controlled through a fence and gates. A chain link fence will be maintained along the perimeter of the Waste Disposal Cell. The wire fence will display

Attachment 1  
Pennzoil Post-Closure Permit  
~~September-October 30 2014,~~  
~~2014~~ March 2019

warning signs every 100 feet along the perimeter of the fence. These warning signs shall be legible at a distance of 100 feet and will display “**Danger - Unauthorized Personnel Keep Out.**” Security at the site will be maintained by during the post-closure period.

The gates to the former Pennzoil refinery site will be locked all the time if no personnel duly authorized by the Permittees are present on site.

## ATTACHMENT 2: INSPECTION PLAN

### 1.0 PURPOSE AND OBJECTIVES

A post-closure inspection plan will be implemented to periodically assess the condition of the closed unit. This plan will address:

- Security-control devices
- Cover settlement and displacement
- Integrity of erosion-protection layer
- Integrity of run-on and run-off control measures
- Functioning of cover drainage system
- Monitoring well conditions
- Benchmark integrity

### 2.0 SCHEDULE AND CHECKLIST

Routine inspections will be performed semi-annually. A copy of the semi-annual inspection log is shown in Figure 2-1. To the extent possible, inspections will be performed by the same person, thus allowing changes to be more readily noticed. Completed inspection forms will be included in the annual report submitted to the Division of Waste Management and Radiation Control~~Solid and Hazardous Waste~~, as specified by Condition III.C.1. of this Permit.

Specifics of the inspections are as follows:

- **Security Control Devices:** The fence and gates that control access to the disposal cell will be visually inspected semi-annually. Care will be taken to observe for signs of weakness, damage, or deterioration to fencing materials, gates, locks, and warnings signs.
- **Cover Settlement and Displacement:** The general integrity of the cover will be visually inspected semi-annually. Observations will be made regarding vertical and horizontal changes in the cover system. A survey marker was established on the completed cover during final construction. Once every three years this marker will be surveyed to determine if horizontal or vertical changes in location have occurred.
- **Integrity of Erosion Protection Layer:** The final gravel layer on the cover will be visually inspected semi-annually for signs of damage. Care will be taken to note the formation of rills, cracks, depressions, and any unusual signs of wetness. In particular, observations will be made to determine if the underlying soil layer or geomembrane is exposed.
- **Integrity of Run-on and Run-off Control Measures:** Run-on and run-off control measures will be visually inspected semi-annually. This will include inspection of gravel on the face of the embankment adjacent to the former stream channel as well as top and embankment slopes that will be subjected to sheet flow. Observations will be made regarding the

formation of rills and depressions that may locally concentrate run-off and increase erosion potential.

- **Functioning of Cover Drainage System:** The cover drainage system is buried and, therefore, not directly visible. However, semi-annual observations will be made of the edge of the embankments at the depth the drainage layer exists. Observations will be made as to persistent wetness at that point (long after a precipitation event) that would suggest clogging or buildup of pressure within the drainage system. Exposure of the geofabric will also be noted on the inspection log.
- **Monitoring Well Conditions:** The monitoring wells associated with the WDC will be inspected semi-annually. This inspection will check for whether the locking caps are in place and locked and will note if there is any visual damage to the well casing. Whenever samples are collected from the monitoring well additional observations will be made of the inside of the protective casing and well casing, including signs of damage, discoloration, and depth to bottom of well, etc. Notes will also be kept during sampling of any difficulties in lowering or retrieving pumps and probes used for sample collection. (Note that record of inspections associated with sampling events will be kept in the sampler's field log book.)
- In addition, the monitoring wells associated with SWMUs will be inspected annually. The locks of all SMWUs wells and piezometers will be inspected and replaced if damaged. Inspection notes will be summarized in the annual Groundwater Monitoring and Site Management report.
- **Benchmark Integrity:** The integrity of the benchmark used for surveying settlement of the closed unit will be visually inspected at the time of surveying. Care will be taken to note signs of damage that suggest either vertical or horizontal offset of the benchmark.

### 3.0 MAINTENANCE PLAN

Items requiring maintenance will be noted during the inspections. Minor items requiring maintenance will be handled by the inspector. Any item the inspector cannot handle will be repaired through a qualified contractor. Particular care will be taken to resolve maintenance items created by settling, subsidence, and erosion. The Utah Division of Waste Management and Radiation Control ~~Solid and Hazardous Waste~~ shall be notified if any corrective maintenance procedure will require more than five working days to complete.

Items requiring minimal repair and no independent inspection (e.g., minor rills, small depressions, etc.) will be corrected within five working days. If more extensive repair or an independent inspection is required due to the magnitude of the problem (i.e., extensive erosion, major settlement, etc., the following schedule will be observed:

- Document the problem with notes, drawings, and/or photographs.

- Provide interim repair to the extent necessary to protect the closed facility from additional damage.
- Within five working days of the initial inspection, contract for independent inspection if deemed necessary. Conduct the independent inspection within ten working days of the initial inspection that identified the problem. During the independent inspection, determine specific remedial measures that are necessary to repair the problem.
- Within five working days of initial inspection, notify the Utah Division of Waste Management and Radiation Control~~Solid and Hazardous Waste~~ of the problem and the measures being undertaken to correct it.
- Within ten working days of the independent inspection, contract with outside services if required to complete the repair. Begin the repair with two weeks of the independent inspection. Complete the repair as expeditiously as possible thereafter.

**PENNZOIL-QUAKER STATE COMPANY**  
**d.b.a. SOPUS Products**  
 Former Pennzoil Roosevelt Refinery

**POST-CLOSURE INSPECTION/MAINTENANCE LOG**  
 Waste Disposal Cell

Please fill out form completely. If any item is marked yes for maintenance required, you must follow up immediately and ensure that item is properly repaired.

Facility Component	Required Inspection Interval	What to Look For	Maintenance Required?		Observations & Comments
			Yes	No	
Security Fence	Semi-annually	Breaks? Signs of Weakness?			
Warning Signs	Semi-annually	Missing or unreadable at 100'?			
Gates/Locks	Semi-annually	Broken or unlocked?			
Cover Settlement (visual)	Semi-annually	Cracks? Depressions? Other signs of settlement disturbances?			
Cover Displacement (visual)	Semi-annually	Cracks? Depressions? Bulges? Other signs of displacement?			
Erosion Protection Layer (gravel)	Semi-annually	Cracks? Depressions? Unusual signs of wetness? Gaps in gravel cover?			
Run-on/Run-off Control	Semi-annually	Gravel cover damaged? Rills? Cracks? Gaps?			
Cover Drainage System	Semi-annually	Persistent/excessive wetness along drainage exists? Geofabric exposed?			
Monitoring Well Condition: Check the following wells to see that the casings, caps and concrete pads are not damaged and that the wells are locked.	Semi-annually	Well ID	Status		
		MW-7			
		MW-11			
		MW-12			
		MW-19			
		MW-20			
		MW-21			
Survey Marker (instrument)	Three Years	Original datum: Surveyed datum this inspection?			
Benchmark Integrity	Three Years	Damage? Visible offset? (horizontal or vertical?)			

Inspector: \_\_\_\_\_

Date of Inspection: \_\_\_\_\_

Time of Inspection: \_\_\_\_\_ A.M. / P.M.

Figure 2-1

## ATTACHMENT 3: CONTINGENCY PLAN

### 1.0 APPLICABILITY, PURPOSE AND IMPLEMENTATION

#### 1.1 Applicability (R315-~~264-508-4.1~~ of Utah Admin. Code)

This Contingency Plan applies to the closed hazardous waste impoundments (Waste Disposal Cell or WDC) at the Former Pennzoil Refinery, Roosevelt, Utah.

#### 1.2 Purpose (R315-~~264-51(a)~~8-4.2(a) of Utah Admin. Code)

The purpose of this Contingency Plan is to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden discharge of hazardous waste or hazardous waste constituents to air, soil, groundwater, or surface water.

#### 1.3 Implementation (R315-~~8-4.2~~264-51(b) of Utah Admin. Code)

The provisions of this plan shall be carried out immediately whenever there is a fire, explosion, or any unplanned sudden or non-sudden discharge of hazardous waste or hazardous waste constituents which could threaten the environment or human health.

### 2.0 CONTINGENCY PLAN (R315-~~264-52~~ of Utah Admin. Code ~~8-4.3~~)

#### 2.1 Emergency Procedures (R315-~~8-4.7~~264-56 of Utah Admin. Code)

The following procedures will be followed whenever there is an imminent or actual emergency situation from discharge, fire, or explosion.

##### 2.1.1 Communications (R315-~~8-4.7~~264-56(a) of Utah Admin. Code)

The Emergency Coordinator will activate communication systems to notify facility personnel (contractors, owner, and tenants) and appropriate State and local agencies with designated response roles whenever their assistance is needed. Communication will be provided via telephone according to the call list, included in Appendix 3-A.

##### 2.1.2 Incident Assessment (R315-~~8-4.7~~264-56(b) of Utah Admin. Code)

The Emergency Coordinator will identify the character, exact source, amount, and areal extent of any discharged materials. This will be done by observation or review of facility records, and, if necessary, by chemical analysis.

2.1.3 Hazard Assessment (R315-~~264-568-4.7~~(c) of Utah Admin. Code)

The Emergency Coordinator will assess possible hazards to human health or the environment that may result from discharge, fire, or explosion. This assessment will include both direct and indirect effects of the discharge, fire, or explosion, e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off or hazardous groundwater infiltration from water or chemical agents used to control fire and heat-induced explosions.

2.1.4 Assessment Report (R315-~~8-4.7264-56~~(d) of Utah Admin. Code)

The Emergency Coordinator will report his assessment that the Waste Disposal Cell has had a discharge, fire, or explosion which could threaten human health, or the environment, outside the facility, as follows:

- If the assessment indicates that evacuation of local areas may be advisable, he will notify appropriate local authorities according to the call list in Appendix 3-A. He will be available to assist appropriate officials in making the decision whether local areas should be evacuated; and
- He will immediately notify both the Utah Department of Environmental Quality and the government official designated in the regional contingency plan as the on-scene coordinator for the geographical area of the Waste Disposal Cell, or the National Response Center at 800-424-8802 (also see call list in Appendix 3-A).

The report will include the following items:

- Name and telephone number of reporting individual;
- Name and address of the facility;
- Time and type of incident, e.g., discharge, fire, explosion;
- Name and quantity of material(s) involved (to the extent available);
- The extent of injuries, if any; and
- The possible hazards to human health or the environment, outside the facility.

2.1.5 Emergency Measures (R315-~~8-4.7264-56~~(e) of Utah Admin. Code)

During an emergency, the Emergency Coordinator will take all reasonable measures necessary to ensure that fires, explosions, and discharges do not occur, recur, or spread to other hazardous waste at the facility. These measures will include, where applicable, stopping processes and operations, collecting and containing discharged waste, and removing or isolating containers.

| 2.1.6 Monitoring (R315-~~264-568-4.7~~(f) of Utah Admin. Code)

If the facility stops operations in response to a discharge, fire, or explosion, the Emergency Coordinator will monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

| 2.1.7 Recovered Material (R315-~~8-4.7264-56~~(g) of Utah Admin. Code)

Immediately after an emergency, the Emergency Coordinator will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any material that results from a discharge, fire, or explosion at the facility. All recovered material will be handled and managed as a hazardous waste unless it is analyzed and determined not to be.

| 2.1.8 Cleanup Procedures (R315-~~8-4.7264-56~~(h) of Utah Admin. Code)

The Emergency Coordinator will ensure that:

- No waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and
- All emergency equipment listed in the Contingency Plan is cleaned and fit for its intended use before operations are resumed.

| 2.1.9 Compliance Notification (R315-~~264-568-4.7~~(i) of Utah Admin. Code)

The facility owner or operator will notify the Executive Secretary and other appropriate State and local authorities, that the facility is in compliance with R315-~~8-4.7264-56~~(h) of Utah Admin. Code before operations are resumed.

| 2.1.10 Final Incident Report (R315-~~8-4.7264-56~~(j) of Utah Admin. Code)

Within 15 days after the incident, Pennzoil-Quaker State Company d.b.a. SOPUS Products will record in the operating record, and include in a final written report to Executive Secretary of the Utah Solid and Hazardous Waste Control Board, the following information:

- Name, address, and telephone number of Pennzoil-Quaker State Company d.b.a. SOPUS Products;
- Name, address, and telephone number of the facility;
- Date, time, and type of incident, e.g., discharge, fire, explosion;
- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazards to the environment or human health, where this is applicable; and
- The estimated quantity and disposition of recovered material that resulted from the incident.

2.2 Arrangements With Local Authorities (R315-~~8-3-7264-37~~ of Utah Admin. Code)

Pennzoil-Quaker State Company previously made arrangements with local authorities, as appropriate for the type of waste handled at the facility and the potential need for the services of these organizations:

- Arrangements to familiarize law enforcement agencies, fire departments, and emergency response teams with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes;
- Where more than one law enforcement agency and fire department might respond to an emergency, agreements designating primary emergency authority to a specific law enforcement agency and a specific fire department, and agreements with any others to provide support to the primary emergency authority;
- Agreements with State emergency response teams, emergency response contractors, and equipment suppliers; and
- Arrangements to familiarize local hospitals with the properties of hazardous waste handled at the facility and the types of injuries or illnesses which could result from fires, explosions, or releases at the facility.

Arrangements with local authorities will be formalized with a letter and a copy of the approved Contingency Plan. Where State or local authorities decline to enter into these arrangements, Pennzoil-Quaker State Company d.b.a. SOPUS Products shall document the refusal in the operating record.

2.3 Emergency Coordinator (R315-~~264-55~~ of Utah Admin. Code ~~8-4-6~~)

The primary Emergency Coordinator is:

Mr. Dan Kirk (Principal Program Manager)  
~~Pennzoil-Quaker State Company, dba Shell Oil Products US (SOPUS)~~  
~~Shell Soil and Groundwater Focus Delivery Group, Major Projects TSP 2155 B~~  
~~150 N. Dairy Ashford 777 Walker Street~~  
Houston, TX ~~77079 77002~~  
Telephone: ~~(832) 337-8276 (713) 241-7140~~  
Cell: (281) 217-9492

The secondary Emergency Coordinator is:

~~GHD Pennzoil—Quaker State Company d.b.a. SOPUS Products~~  
~~HSSE Crisis Incident Hotline~~  
~~866-813-9565 800-848-7525~~

| 2.4 Emergency Equipment (R315-~~8-3-3264-32~~ of Utah Admin. Code)

The Former Pennzoil Roosevelt Refinery is inactive and no longer in operation. This document applies only to the Waste Disposal Cell, which is a closed hazardous waste impoundment. Pennzoil-Quaker State Company d.b.a. SOPUS Products maintains no emergency equipment on site and will rely upon local response agencies and contractors to provide emergency equipment.

| 2.4.1 Internal Communications (R315-~~8-3-3264-32~~(a) of Utah Admin. Code)

Internal communications between contractor personnel will be by cellular telephone, two-way radio, or other audio or visual means.

| 2.4.2 External Communications (R315-~~8-3-3264-32~~(b) of Utah Admin. Code)

Contractors working at the site will have access to external emergency services including local law enforcement agencies, fire departments, or State or local emergency response teams via cellular telephone.

| 2.4.3 Equipment (R315-~~8-3-3264-32~~(c) of Utah Admin. Code)

Contractors working at the site will supply and have immediate access to the following minimum equipment:

- 2 – 20lb portable dry chemical fire extinguishers;
- 1 – portable eyewash;
- 1 – first aid kit;
- 1 – shovel; and
- 1 – decontamination unit (means to thoroughly decontaminate personnel and equipment).

| 2.4.4 Water (R315-~~264-328-3-3~~(d) of Utah Admin. Code)

Water is available at the former Maintenance Building. Water necessary to control a fire will be supplied by the local fire department.

| **2.5 Evacuation Plan (R315-~~8-4-3264-52~~(e) of Utah Admin. Code)**

Pennzoil-Quaker State Company has no personnel working at this facility. Contracted personnel perform the required semi-annual inspections and annual groundwater monitoring at the site. Evacuation from the vicinity of the Waste Disposal Cell will be via the facility road to the east and south, exiting the former refinery area through the main gate (Figure 3-1).

| 3.0 COPIES OF CONTINGENCY PLAN (R315-~~264-538-4.4~~ of Utah Admin. Code)

Copies of the Contingency Plan and any revisions will be:

- Maintained at the facility;
- Made available upon request;
- Submitted as part of the post-closure permit; and
- Submitted to all local law enforcement agencies, fire departments, hospitals, and State and local emergency response teams that may be called upon to provide emergency services (see list in Appendix 3-A).

| 4.0 AMENDMENT OF CONTINGENCY PLAN (R315-~~264-548-4.5~~ of Utah Admin. Code)

The Contingency Plan shall be reviewed, and immediately amended, if necessary, under any of the following circumstances:

- Revisions to the facility permit;
- Failure of the plan in an emergency;
- Changes in the facility design, construction, operation, maintenance, or other circumstances that materially increase the potential for fires, explosions, or discharges of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency;
- Changes in the list of emergency coordinators; or
- Changes in the list of emergency equipment.

APPENDIX 3-A

CALL LIST

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**EMERGENCY CALL LIST**  
 Waste Disposal Cell  
 Former Pennzoil Refinery  
 Roosevelt, Utah

NAME/ADDRESS	RESPONSIBILITY	TELEPHONE
<i>Emergency Coordinators</i>		
Dan Kirk <a href="#">Pennzoil-Quaker State Company</a> dba Shell Oil Products US (SOPUS) <a href="#">Soil and Groundwater Focus</a> <a href="#">Delivery</a> <a href="#">Group;</a> <a href="#">Major Projects TSP 2155 B</a> <a href="#">150 N. Dairy Ashford 777</a> <a href="#">Building A 5<sup>th</sup> Floor Walker</a> <a href="#">Street</a> Houston, TX <a href="#">7707977002</a> Telephone: <a href="#">(832) 337-8276</a> <del>(713) 241-7140</del>	Emergency Coordinator	Office: <a href="#">(832) 337-8276</a> <del>(713) 241-7140</del> Cell: (281)217-9492
<a href="#">GHD Pennzoil-Quaker State</a> <a href="#">Company HSSE Crisis Incident</a> <a href="#">Hotline</a>	Emergency Coordinator	<del>866-813-9565 (800) 848-</del> <del>7525</del>
<i>Local Emergency Responders</i>		
Ambulance	Emergency Medical Response	911 – Emergency
Uintah Basin Medical Center 250 W. 300 North Roosevelt, Utah 84066	Injury/Illness Treatment	911 – Emergency (435) 722-4691 – General
Roosevelt Fire Department 255 South State Street Roosevelt, UT 84066	Fire Response	911 – Emergency (435) 722-4893 – Office
Roosevelt City Police 255 South State Street Roosevelt, UT 84066	Law Enforcement	911 – Emergency (435) 722-2330 – Office (435) 722-4558 – Dispatch
Duchesne County Sheriff 1664 S. 2000 West Duchesne, UT 84021	Law Enforcement	911 – Emergency (435) 738-0196 or (435) 722-4444
Utah Highway Patrol <a href="#">615 East, 300 South, Suite 300</a> <del>255 South State Street</del> <a href="#">Vernal</a> Roosevelt, UT <a href="#">84078</a> <del>84066</del>	Law Enforcement	911 – Emergency (435) <del>781-6740</del> <del>722-0259</del> – Office
<i>State Regulatory Oversight/Response</i>		

Comment [HZ1]: No working number

Emergency Call List (Continued)

NAME/ADDRESS	RESPONSIBILITY	TELEPHONE
<del>Hao Zhu Brad Maulding</del> UDEQ/DSHW/MRC 195 North 1950 West <del>PO Box 144880</del> Salt Lake City, UT <del>84116 84114-4880</del>	Oversight during Post-Closure	(801) 536-0200 – General (801) 536-0249 05 – Direct
<i>Regional, State, and Federal Response</i>		
Mike Lefler - Director Duchesne County Emergency Management P.O. Box 228 Duchesne, UT 84021	Tri-County Local Emergency Planning Committee	(435) 738- <del>1226</del> 1181 – Office
UDEQ/DSHW	Regulatory Oversight	(801) 536-0200 (801) 536-4123 – After Hours
National Response Center	National Response Coordination	800-424-8802
<i>Property Owner</i>		
John H. Wells Manager Roosevelt Land Investment, LLC 465 South 200 West, #300 Bountiful, UT 84010	Owner Representative	(801) 292-3800 – office <a href="tel:801-230-7220">801-230-7220</a> – cell <a href="tel:435-823-5326">435-823-5326</a> – alternate contact Paul Wells
<i>Tenant</i>		
Tracy Williams Foreland Transportation West Hwy 40 Roosevelt, UT 84606	Tenant Representative	(435) 725-5128
<i>Response Contractors</i>		
<del>AECOM ARCADIS U.S., Inc.</del> <del>12420 Milestone Center Dr. Suite 150</del> <del>410 North 44th Street, Suite 1000</del> <del>Germantown, MD 20876</del> <del>Phoenix, AZ 85008</del>	Environmental Consultant	<del>(602) 438-0883</del> <del>(301) 302 1398</del> <del>(301) 820 3000</del>
<del>Clean Harbors PSC</del> <del>9 Miles East 7 Miles North of Knolls</del> <del>2525 South 1100 West Grantsville, UT 84029</del> <del>Woods Cross, UT 84087</del>	Hazardous & Solid Waste Transportation and Disposal	<del>(781) 792-5000</del> <del>(801) 294-9882</del> <del>(801) 294-9880</del>
<i>Utilities</i>		
Moon Lake Electrical Assoc. 188 W. 200 North	Electrical Power	(435) 722-5400

Emergency Call List (Continued)

Roosevelt, UT 84066		
Roosevelt City 255 South State Street Roosevelt, UT 84066	Water, Sewer, Garbage	(435) 722-5001
Questar Gas 115 E. 100 South Roosevelt, UT 84066	Natural Gas	(435) 722-2521

## ATTACHMENT 4: PERSONNEL TRAINING

### 1.0 PURPOSE

All personnel involved in post-closure inspection, monitoring, and maintenance at the Waste Disposal Cell will have received training in accordance with this document and will be specifically trained in the performance of their post-closure activities. Those covered by this training will include inspection, monitoring, and maintenance personnel.

### 2.0 TRAINING REQUIREMENTS

The training will include:

- **Inspection Personnel:** Inspection personnel will have adequate training and/or practical experience to assess the nature and extent of problems that may develop at the WDC. If this knowledge has not been gained as a result of previous training or practical experience, specific training will be provided by a civil engineer, an engineering geologist, or by an individual with sufficient experience in such inspections to train others. Training will be provided in use of the inspection form, signs of erosion and settlement, how to determine the adequacy of the run-on and run-off control measures, and how to evaluate monitoring well integrity.
- **Monitoring Personnel:** Individuals involved in collection of monitoring data will have either prior experience or receive formal training in the collection of groundwater quality data. All monitoring personnel will understand the specific methods required for the WDC monitoring wells. **All monitoring personnel will have training in hazardous waste operations required by OSHA (29 CFR 1910.120), including an initial 40-hour course and annual 8-hour refresher courses.**
- **Maintenance Personnel:** Any maintenance personnel who are involved with work on the WDC will be provided with information regarding the construction of the closed facility. This information will include a discussion of the physical and chemical characteristics of the waste and cover materials. The design of the WDC will be emphasized to ensure the facility is properly maintained.

**ATTACHMENT ~~65~~:**

SOLID WASTE MANAGEMENT UNITS  
FORMER PENNZOIL REFINERY, ROOSEVELT, UTAH

<u>SWMU No.</u>	<u>Solid Waste Management Unit's Name</u>
1. BO-1	K050 Heat Exchange Area
2. BO-2	Spent Phosphoric Acid Area
3. RS-1	Refinery Sewer System
4. RS-2	Waste Water Treatment System
5. P-1	Old API Separator System
6. P-2	New K050 Cleaning Area
7. P-3	Old K050 Cleaning Area
8. P-4	Waste Disposal Cell (WDC)
9. P-5	Hydrocarbon Seep
10. P-6	Oily Dirt Pad
11. P-7	Oil Recovery Tank System
12. P-8	Slop Oil Tank
13. P-9	Old API Oil Pond
14. P-10	Landfills A and B
15. P-11	Spent Solvent Parts Cleaning Unit
16. P-12	Tank Dike A Water Draw
17. P-13	Tank Dike B Water Draw
18. P-14	Tank Dike C Water Draw
19. P-15	Tank Dike D Water Draw
20. P-16	Tank Dike E Water Draw
21. P-17	Tank Dike F Water Draw

22.	P-18	Tank Dike G Water Draw
23.	P-19	Tank Dike H Water Draw
24.	P-20	Tank Dike I Water Draw
25.	P-21	Tank Dike J Water Draw
26.	P-22	Tank Dike K Water Draw
27.	P-23	Tank 40 Area Water Draw
28.	P-24	Tank 41 Area Water Draw
29.	P-25	Tank 6 Area Water Draw
30.	P-26	Desalting Tower
31.	P-27	Desulfurization Unit
32.	P-28	Storage Unit
33.	P-29	FCC
34.	P-30	Spent Phosphoric Acid Catalyst Area
35.	P-31	Tetraethyl Lead Sump
36.	P-32	90-Day Storage Area
37.	P-33	East Control Building
38.	P-34	Crude Unloading Pad
39.	P-35	Platformate Load Station
40.	P-36	Borrow Pit

See Figure ~~56~~-1 for locations of SWMUs. [The Status of the SWMUs can be found in Corrective Action Plan submitted to Utah Department of Environmental Quality in June 2009.](#)

## ATTACHMENT ~~67~~: STATISTICAL PROCEDURES

### 1.0 INTRODUCTION

As part of the post-closure permit for the waste disposal cell (WDC) at the former Pennzoil refinery, Roosevelt, Utah, the Utah Department of Environmental Quality, Division of Solid and Hazardous Waste (UDEQ/DSHW) requires a statistical evaluation of groundwater monitoring data collected from wells adjacent to the WDC. This document, *Attachment ~~67~~ – Statistical Procedures*, is the portion of the permit that explains the statistical methods employed to evaluate the groundwater data.

The objective of statistically evaluating the data is the timely detection of possible groundwater degradation due to the WDC, while at the same time reducing the probability of falsely concluding that groundwater quality has degraded when it has not (false positive). To satisfy this objective, groundwater quality data are collected from 6 (six) monitoring wells at the WDC; MW-7 and MW-12 are background wells, whereas MW-11, MW-19, MW-20, and MW-21 are compliance wells. Groundwater samples ~~have been~~ were collected from these wells semi-annually ~~since from~~ 1992 to 2008, except MW-7 where ~~sampling began at 1996~~. From 2009 to 2018, groundwater samples were collected annually from all six wells. This current permit modification proposes to reduce the sampling frequency for general chemistry parameters and dissolved metals to every five years, while maintaining the annual sampling frequency for volatile organic compounds (VOCs).

The Shewart-CUSUM control charting technique (~~EPA, 1992~~ USEPA, 2009; ~~Gibbons, 1994~~ Gibbons et al., 2009; ~~ASTM, 1996~~ ASTM, 1998) is the main method proposed for future statistical evaluation of data from the WDC. This is an intra-well approach in which the current measured concentration of a groundwater constituent within a well is compared with the ~~past~~ historic records of the constituent in the same well. No inter-well comparisons are performed between compliance wells and background wells, or between compliance wells, thereby avoiding the high false positive rate inherent to inter-well comparisons (~~EPA, 1992~~ USEPA, 2009; ~~Gibbons, 1994~~ Gibbons et al., 2009). The use of the intra-well Shewart-CUSUM technique is justified because monitoring at the WDC suggests that there are naturally occurring spatial differences in groundwater chemistry between the background and compliance wells, and the historical records since 1992 indicates no significant impacts to groundwater quality that ~~can~~ could be ascribed to the WDC. The use of an intra-well approach eliminates the confounding results due to spatial variability (USEPA, 2009).

The remainder of this document describes the Shewart-CUSUM methodology in more details, including the underlying assumptions of the method, how data will be evaluated to determine whether the assumptions are satisfied, and how violation of these assumptions will be addressed. The steps in the data evaluation procedure are then explained using a flow chart in which decision points are clearly identified and the data analysis procedures are indicated. The data analysis procedures are based on U.S. Environmental Protection Agency guidance documents (EPA, 1992; USEPA, 2009; 2000; 2006) and are also well documented in the environmental statistics literatures (Gilbert, 1987; Gibbons, 1994; Gibbons et al., 2009). The described procedures are consistent with the Utah Hazardous Waste Rules, specifically R315-8-6, Groundwater Protection.

## 2.0 STATISTICAL EVALUATION METHODOLOGY

### 2.1 Shewart-CUSUM Control Charts

Shewart-CUSUM control charts were developed for statistical quality control of manufacturing processes (Bowker and Lieberman, 1972; Alwan, 2000) and have been adapted to groundwater monitoring at landfills (Gibbons, 1994; Gibbons et al., 2009). The basic idea is to use a time series record of a process, groundwater quality measurements in this case, to evaluate the current and very recent behavior of the process. If the current and very recent behavior is within the limits of natural random fluctuations consistent with the past behavior of the process, the process is considered to be in control. If the current and very recent behavior is beyond the limits exhibited in the past, the process is considered to be out of control. The key point is that the historical background (baseline) data used as the basis for comparisons are obtained from the well itself (i.e., an intra-well approach). In the context of groundwater monitoring, "in control" behavior indicates no adverse impact to groundwater quality, whereas "out of control" behavior suggests the potential for adverse impact to groundwater.

Accordingly, the two key objectives of the statistical evaluation are to: 1) establish upper control limits for each constituent in each well, based on the past history in the well; and 2) compare current monitoring results to the upper control limits.

There are two components to this control chart approach. The Shewart methodology focuses solely on the current measured concentration of a monitored groundwater constituent (arsenic, for example) and its

relation to the mean measured concentration of the constituent within ~~a~~ the same well as computed from past measurements. It is sensitive to large and sudden changes, but less sensitive to slow, upward trending changes in measured concentration. The CUSUM methodology measures cumulative deviations from the mean, and thus incorporates information from previous measurements in the recent past; it is sensitive to small, gradual changes in the mean relative to the historical records. The Shewart and CUSUM statistics are presented below, within the context of the overall data evaluation procedure (Section 2.3). EPA/USEPA (1992/2009), ASTM PS-64-96 (1996/1998), and Gibbons et al. (1994/2009), describe the Shewart-CUSUM approach in detail.

## 2.2 Requirements and Assumptions

The Shewart-CUSUM method requires that enough historical measurements are available to obtain reasonable estimates of the mean and variance for the groundwater constituent within a particular well. The method further assumes that the data are independent, meaning that they are uncorrelated and do not exhibit a trend, and that they are identically distributed samples from a Gaussian (normal) distribution. Thus, although the Shewart-CUSUM method is the key to evaluating the effect on groundwater quality of the WDC, other statistical methods are needed to assess whether these basic conditions are satisfied. These supporting methods are described in the next section, which presents a step-by-step narrative of the entire data evaluation process together with a flow chart illustrating the decision logic of the process. The narrative also describes the procedures to be followed when the conditions are not met.

Before proceeding, however, it is important to note that some aspects of the statistical evaluation rely on time series analysis techniques (Box et al., 1994; Chatfield, 2004), which usually require at least 50 measurements at equally spaced intervals. The WDC groundwater monitoring data do not satisfy this requirement. At most, ~~only 22~~ around 30 to 40 measurements were available ~~in through March-May 2003-2016 (the last time baseline data were updated)~~ for the majority of the groundwater constituents, ~~and although~~ the data were acquired on a semi-annual basis in the spring and fall earlier and on an annual basis later, and thus, the measurements are not strictly evenly spaced. In spite of these shortcomings, standard time series analysis techniques will be utilized.

Furthermore, in many instances, a measurement in which a constituent is not detected is replaced by the median of the reporting limit for the given well-constituent for evaluation purposes. This practice amounts to replacing censored data with ~~some~~ a fixed number, and can distort statistical inferences

**Comment [HG1]:** How is independence checked? Is estimating the acf at lag=1 with a .01 significance level sufficient? What about estimating the partial acf in order to determine the order of the acf? Could there also be a significant moving average process contributing to a trend? Finally, what if trends exist but are non-linear? Please elaborate.

**Comment [HG2]:** Won't this method decrease the true, unknown variance of the data set? Have methods from statistical survival analysis been considered (e.g., Helsel, 2004, Non-detects and Data Analysis, chapters 11 and 12)?

because qualitative data (non-detects, meaning concentrations somewhere below or “less-than” the ~~method detection reporting~~ limit) are combined with quantitative data (concentrations above the ~~practical quantitation reporting~~ limit). For example, if 50% of the measurements for a constituent are non-detects, the data histogram will exhibit a large spike on the left, since an unusually large fraction (50%) of the measurements occur at the median reporting limit for the given well-constituent.

Throughout the following narrative, the sample variance is assumed to be constant through time. As previously noted, the time series involved are short and do not provide the historical record needed to thoroughly assess the issue of heteroscedasticity. In the future, when the record is longer (>50), it may be possible to address heteroscedasticity by comparing the variance computed from different segments of the record.

### 2.3 Evaluation Procedure

The description of the data evaluation procedure pertains to a single constituent in an individual well. It must be applied to each constituent in the well, and to each well, including the up-gradient wells. For purposes of explanation, denote the measured concentrations for the constituent in a well as  $\{x_1, x_2, \dots, x_N\}$ , where the subscript  $i$  represents sampling event (and thus time) and  $N$  is the number of sampling events under consideration.

There are two stages in the data evaluation. In the first stage, a background (baseline) period is specified, the data within the background period are evaluated to determine whether the Shewart-CUSUM assumptions are met, the data are adjusted if necessary to meet the assumptions, and the Shewart-CUSUM upper control limits are established. This stage constitutes modeling of the historical records to establish the basis for evaluating whether future measurements are consistent with past behavior. It is performed at the outset, prior to evaluation of measurements from subsequent monitoring events, and is periodically updated as the historical records increase in length. ~~It~~ This update is not performed for each individual monitoring event.

In the second stage, a current measurement is evaluated in relation to the upper control limits established using the data from the background period. Much of the analysis used to evaluate the background data is not repeated for each monitoring event, in particular for the assessment of whether the Shewart-CUSUM assumptions are satisfied, and the determination of the upper control limits. Determinations

that are made during the development of the historical model in the first stage (for example, that the data exhibit a particular trend) are kept fixed and are not reevaluated until the historical model is updated.

Data from ~~approximately 22-30 to 40~~ sampling events were available ~~throughin March-May 20032016-~~. ~~The first 20 of~~ these historic data are proposed to be used for development of the historical model (first phase), with ~~the data from the 21<sup>st</sup> and 22<sup>nd</sup>~~ all subsequent events analyzed according to the procedures for the second stage of data evaluation, and the historical model is proposed to be updated every eight (8) new sampling events/data points (four years) beyond the 20<sup>th</sup> event (i.e., the 28<sup>th</sup>, 36<sup>th</sup>, 44<sup>th</sup>, etc.) after 2016.

### 2.3.1 Development of the Historical Model

Each of the subsections below corresponds to a decision element shown in Figure ~~67-1~~, a flowchart of the procedure for developing the Shewart-CUSUM upper control limits. ~~For this purpose,  $N = 20$ .~~

### 2.3.1.1 Detection Frequency

To ensure that a reasonable number of historical background data is available, the Shewart-CUSUM method is applied only to a constituent with a detection frequency greater than 25% (less than 75% non-detects). When there are more than 75% non-detects, the time series is plotted and the prediction limit is set to the maximum of the  $\{x_i\}$ . If the measured concentration in a future sampling event exceeds the prediction limit (i.e., the maximum value), the exceedance is verified by the next round of sampling. If the exceedance is confirmed, UDEQ/DSHW will be notified and the prediction limit will be updated.

When the detection frequency is greater than 25%, non-detects are replaced by the median of the reporting limit.

### 2.3.1.2 Descriptive Statistics and Data Plots

The basic descriptive sample statistics of the  $\{x_i\}$  (mean, median, standard deviation, minimum, maximum, absolute range, 25<sup>th</sup> percentile, 75<sup>th</sup> percentile, and interquartile range, ~~skewness, and kurtosis~~) are computed and tabulated. The time series is plot is prepared for each well and each constituent, as well as a box and whisker plot and probability plot of the data. This is a standard, basic step of data analysis and characterization.

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### 2.3.1.3 Identification of Linear Trends

Trending data violate the independence assumption of the Shewart-CUSUM method. Prior to the Shewart-CUSUM calculation, the existence of a linear trend is investigated using a ~~robust linear regression technique~~ the non-parametric Theil-Sen trend test, described by Hintze as recommended by USEPA (201504), with significance at the 99% confidence level for a null hypothesis of no trend against a two-tailed alternative (i.e., existence of either increasing or decreasing trend). ~~Robust regression~~ The Theil-Sen trend test is a ~~least-squares~~ non-parametric technique that is less sensitive to the presence of outliers and the violation of normality assumption than the standard linear regression. Non-linear trends are not investigated.

Comment [HG3]: Please explain why the 99% confidence level is chosen for the null hypothesis, and why it is proposed that non-linear trends are not investigated.

Both the slope  $\hat{m}$  and intercept  $\hat{b}$  are estimated by the Theil-Sen method (USEPA, 2015). The trend line is given by  $\hat{x}_i = \hat{m} \cdot i + \hat{b}$ , where  $\hat{x}_i$  represents an estimate of the measured concentration from the  $i$ th sampling event.

If a trend is detected, it will be assumed to be linear and removed from the time series, except that the overall mean of the time series is maintained in order to keep the evaluation in terms of the magnitude of the measured concentrations. Thus, subsequent analyses are performed with a modified time series  $\{y_i = (x_i - \hat{x}_i) + \bar{x}\}$ , where

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i$$

is the sample mean of the data. The quantity  $(x_i - \hat{x}_i)$  is called the  $i$ th residual.

#### 2.3.1.4 Identification of Correlation

Correlated data also violate the independence assumption of the Shewart-CUSUM method. Following the evaluation, and removal if necessary, of a trend, correlation between the  $\{x_i\}$  (or  $\{y_i\}$ ) is investigated. To evaluate data correlation, the [sample](#) autocorrelation function (acf) (Alwan, 2000; Chatfield, 2004)

$$r_k = \frac{\sum_{i=1}^{N-k} (x_i - \bar{x})(x_{i+k} - \bar{x})}{\sum_{i=1}^n (x_i - \bar{x})^2}$$

is computed and plotted. The quantity  $r_k$  is called the autocorrelation coefficient at the  $k$ th lag. The number of lags  $k$  is equal to  $N/2$  if the number of data  $N$  in the time series is even, and  $(N+1)/2$  if  $N$  is odd. Superimposed on the plot are horizontal lines corresponding to  $\pm 2.33/\sqrt{N}$ . These lines are approximately equal to the 99% confidence limits for the autocorrelation coefficients  $r_k$ : if a coefficient is outside of these limits, it may be viewed as different from zero at the  $\alpha = 0.01$  level of significance and thus an indication of correlation. To test for the significance of autocorrelation, the Ljung-Box  $Q$  and  $p$ -value are computed using a standard commercial statistical software (JMP, 2010). The  $Q$ -statistic is used to test whether a group of autocorrelations is significantly different from zero or to test that the residuals from a model can be distinguished from white-noise. The test is performed at 1% significance level (i.e., the 99% confidence level), which is appropriate to guard against falsely inferring correlation because the time series involved are quite short ( $N < 50$ ,  $N = 20$  for the purpose of developing

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the historical model), fewer than what are generally required as a minimum (50 to 100 samples) for time series analysis.

If  $|t_1| \geq 2.33/\sqrt{N}$  the p-value is less than 0.01, the time series  $\{x_i\}$  (or  $\{y_i\}$ ) is assumed to be a realization of an autoregressive process of order 1, denoted as AR(1), (Alwan, 2000; Chatfield, 2004), for which  $\hat{x}_i = w_0 + w_1 \cdot x_{i-1}$  (or  $\hat{y}_i = w_0 + w_1 \cdot y_{i-1}$ ). The coefficients  $w_0$  and  $w_1$  are obtained by performing a linear regression of  $(x_2, x_3, \dots, x_{20})$ , considered as the dependent variables, against  $(x_1, x_2, \dots, x_{19})$ , considered as the independent variables. Subsequent analyses are performed using the time series of residuals,  $\{u_i = x_i - \hat{x}_i + \bar{x}\}$  (or  $\{u_i = y_i - \hat{y}_i + \bar{y}\}$ ).

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#### 2.3.1.5 Testing for Normality

Testing for normality of the  $\{x_i\}$  (or residuals  $\{y_i\}$  or  $\{u_i\}$ ) is performed using the Shapiro-Wilk W test, which is appropriate when  $N \leq 50$  (Gilbert, 1987; EPAUSEPA, 2006; USEPA 2015). In the future, when  $N > 50$ , D'Agostino's test (Gilbert, 1987) or Lilliefors Test (USEPA, 2015) will be used.

Normality of the  $\{x_i\}$  is one of the assumptions of the Shewart-CUSUM method. The purpose of testing for normality is simply to evaluate whether this assumption is met. When the assumption is not met, a common approach is to transform the data by taking the logarithm of each of the  $\{x_i\}$  or by raising them to a power so that the transformed data are Gaussian. However, as pointed out by Gibbons (1994, 2009), the normality assumption is less important than the independence assumption to the robust performance of the Shewart-CUSUM method. Therefore, we propose to proceed with the Shewart-CUSUM method regardless of whether the distribution of the  $\{x_i\}$  is consistent with a hypothesis of normality, except that a non-parametric upper control limit is established in those cases where normality is rejected. Calculation of the non-parametric control limits is based on the median; a reference is provided in the next section.

The main reason for choosing to use non-parametric control limits is to keep the statistical evaluation in terms of the units of measured concentration  $[ML^{-3}]$  (mg/L). Data transformation generally obscures

this meaning, since it is not clear that the control limits in terms of concentration units are obtained by simple inverse transformation of the control limits established using transformed data.

### 2.3.1.6 Shewart-CUSUM Control Limits

The Shewart-CUSUM method relies on control limits that are based on background statistics for a well that are computed using past measurements from within the well itself. Eight (8) initial samples are often used as a background sample when a monitoring program first gets underway. At the WDC, however, monitoring has been ongoing since 1992, and for most constituents, approximately 30 to 40-22 samples are available up to May 2016. Therefore, the first  $N = 20$  samples, representing 10 years of monitoring, all data collected on or before May 2016 (the last time background statistics were updated) are used to represent background in each monitoring well at the WDC. With these  $N = 20$  background samples, first compute the sample mean:

$$\bar{x}_{bkgnd} = \frac{1}{N} \sum_{i=1}^N x_i$$

and the sample standard deviation:

$$s_{bkgnd} = \left[ \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x}_{bkgnd})^2 \right]^{\frac{1}{2}}$$

With these statistics, compute the upper control limit  $UCL = \bar{x}_{bkgnd} + 4.5 \cdot s_{bkgnd}$ , which serves as the control limit for both the Shewart and the CUSUM methods. In the non-parametric case, the control limit is specified as the upper 95% confidence limit for the  $p = 50\%$  quantile, using the estimation procedure described in Conover (1999) maximum detected value, analogues to the non-parametric prediction limit suggested by USEPA (2009).

**Comment [HG4]:** Normally, one would estimate the upper and lower Shewart control limits, and the CUSUM, critical decision interval. It is unclear why there would be only one control limit. Please elaborate.

The remaining steps in the Shewart-CUSUM procedure are described in the next section.

### 2.3.2 Comparison of Current and Future Data Against Background

The steps outlined above in Section 2.3.1 establish a control limit based on the historical records. The evaluation of current and future sample results is not as exhaustive as the evaluation of the historical data, until the historical model is updated (after every 8 new future sampling events/data points). The entire time series (historical data plus the current data/post-baseline data) is plotted, the descriptive statistics

are computed, and the datum post-baseline data modified according to the model identified in the evaluation of background. For example, if the historical data indicated a historical trend, then the current datum is post-baseline data are de-trended as described above. If normality was not rejected during the historical evaluation, then normality is assumed to apply to the current datum post-baseline data. Then, the comparison with using the Shewart-CUSUM method is as follows:

- 1) Beginning with the 21<sup>st</sup> first sample after the baseline period, in the time series, denote the new measurement taken at time  $j = i - (\text{background sample size}, N) - j = i - 20$  as  $x_j$ . (Recall that the first  $N - 20$  samples were used to compute background and are not subsequently evaluated individually. In general,  $j = 1$  in the first sampling event following the historical evaluation period.)

- 2) At each time  $t_j$ , compute  $S_j = \max[0, (x_j - 0.75s_{bkgnd}) + S_{j-1}]$ , the cumulative deviations from the mean, where  $\max[A, B]$  denotes the maximum of  $A$  and  $B$  and  $S_0 = 0$ . (Note:  $S_j$  is often compute using the standardized quantity

$z_j = (x_j - \bar{x}_{bkgnd}) / s_{bkgnd}$ . However, in doing so the relationship of  $S_j$  to measured concentrations is obscured. The above formula is equivalent to the formula computed using  $z_j$  given in Gibbons (1994/2009) and ASTM (1996/1998). The  $k$  factor (proportion of background standard deviation to be deviated) is suggested to be 0.75 by USEPA (2009) when  $N \geq 12$ .)

- 3) Plot both  $x_j$  and  $S_j$  versus  $j$  (or the date corresponding to  $j$ ) on a time chart, thus constructing the combined Shewart-CUSUM control chart. The control chart also has a horizontal line drawn at a value (y-axis) of  $\bar{x}_{bkgnd} + 4.5s_{bkgnd}$  corresponding to both the Shewart and CUSUM control limits (in the parametric case). As noted by Gibbons (1994/2009), this control limit corresponds approximately to the upper limit of a 95% confidence interval. When either  $x_j$  or  $S_j$  exceed the control limit, a potential impact to groundwater may have occurred and is reported to UDEQ/DSHW. However, it is also possible that the control limit is exceeded due to laboratory error, transcription error, or some other anthropogenic cause (a review of past data from the WDC indicates that this has sometimes occurred). Thus, the report of exceedance to UDEQ/DSHW will include a statement regarding the possible causes of the suspected measurement. The out-of-control condition is then verified on the next round of sampling before further action is initiated. If

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the verification sample is also ~~out of control~~out-of-control, the UDEQ/DSHW will be notified  
and the cause of the exceedance ascribed to the WDC.

**Comment [HG5]:** Will this trigger a corrective action proposal? Please clarify.

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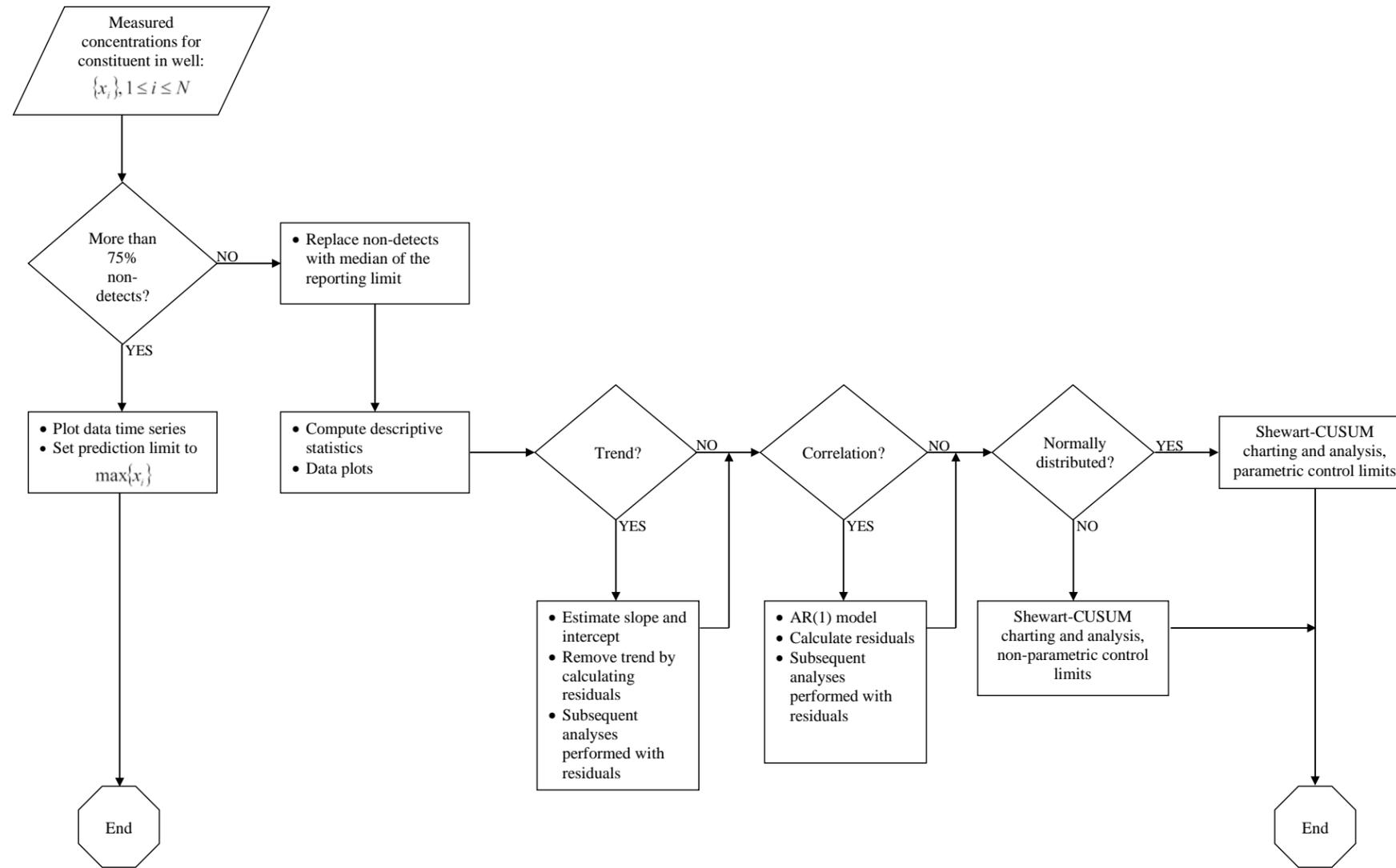


Figure 67-1-2. Flowchart showing main steps used in developing the historical model of groundwater monitoring data from the WDC.