

No. TN0002038

Authorization to discharge under the
National Pollutant Discharge Elimination System (NPDES)

Issued By

**Tennessee Department of Environment and Conservation
Division of Water Pollution Control
401 Church Street
6th Floor, L & C Annex
Nashville, Tennessee 37243-1534**

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)

Discharger: **Nuclear Fuel Services**

is authorized to discharge: **wastewater from fenton's treatment process, laboratory facilities, laundry facility, fuel production facilities, low enriched radioactive operation, high enriched radioactive recovery operations, fuel development, and miscellaneous activities through Outfall 001**

from a facility located: **in Erwin, Unicoi County, Tennessee**

to receiving waters named: **Nolichucky River at mile 94.6**

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on: **August 1, 2006**

This permit shall expire on: **August 31, 2010**

Issuance date: **June 30, 2006**

Paul E. Davis, Director
Division of Water Pollution Control

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PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Nuclear Fuel Services is authorized to discharge wastewater from fenton's treatment process, laboratory facilities, laundry facility, fuel production facilities, low enriched radioactive operation, high enriched radioactive recovery operations, fuel development, and miscellaneous activities through Outfall 001 to the Nolichucky River at mile 94.6.

These discharges shall be limited and monitored by the permittee as specified below:

PERMIT LIMITS						
OUTFALL 001						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) *		Report (MGD) *		1/batch	Estimate
pH	Range 6.0 - 9.0**				1/batch	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30	--	40	--	1/batch	Grab
SOLIDS, SETTLEABLE	--	--	0.5 ml/l	--	1/batch	Grab
CHLORINE, TOTAL RESIDUAL (TRC)****	--	--	2.0	--	1/batch	Grab**
COD	--	--	370	--	1/Month	Grab
NITROGEN, AMMONIA TOTAL	20	--	30	--	1/batch	Grab
NITRITE PLUS NITRATE NITROGEN	--	--	--	420	1/batch	Grab
FLUORIDE, Soluble	15	--	20	--	1/batch	Grab
ARSENIC, TOTAL	--	--	Report	--	1/quarter	Grab
CADMIUM, TOTAL	--	--	0.01	--	1/Month	Grab
CHROMIUM, TOTAL	--	--	Report	--	1/quarter	Grab
COPPER, TOTAL	--	--	1.0	--	1/Month	Grab
LEAD, TOTAL	--	--	0.1	--	1/Month	Grab
MERCURY, TOTAL***	0.00037	--	0.050	--	1/batch	Grab
NICKEL, TOTAL	--	--	Report	--	1/quarter	Grab
SILVER, TOTAL	--	--	0.05	--	1/Month	Grab
URANIUM, NATURAL, TOTAL	2.0	--	4.0	--	1/batch	Grab
TETRACHLOROETHYLENE	--	--	Report	--	1/quarter	Grab

* Flow shall be reported in Million Gallons per Batch.
 ** pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.
 *** The chronic mercury limit shall apply only if the discharge of batches containing mercury occur four (4) or more consecutive days/week during the monitoring period; otherwise, only the daily maximum limit for batches containing mercury shall apply. If any individual analytical test result for mercury is less than the minimum quantification level (0.0002 mg/L), then a value of zero (0) may be used for DMR calculations and reporting requirements.
 **** The total residual chlorine limit is only applicable when chlorine is used in the treatment process.

Additional monitoring requirements and conditions applicable to Outfall 001 include:

There shall be no distinctly visible floating scum, oil or other matter contained in the wastewater discharge. The wastewater discharge must not cause an objectionable color contrast in the receiving stream.

The wastewater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.

Sludge or any other material removed by any treatment works must be disposed of in a manner, which prevents its entrance into or pollution of any surface or subsurface waters.

Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and the Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

NOTE: For the monitoring and reporting of measurements of FLOW, the "Monthly Avg." shall be the total flow volume during the reporting period divided by the number of calendar days in that period. The "Daily Max." shall be the total flow volume for the day with the greatest amount of discharge during the reporting period. Example: 3 discharges of 15,000 gallons/day and 1 discharge of 20,000 gallons/day during a 1-month period results in a Monthly Avg. of 65,000 gallons/30 days, or 2,166 gallons/day (to be reported as 0.002166 MGD). The Daily Maximum to be reported for this example is 20,000 gallons/day or 0.020 MGD.

B. MONITORING PROCEDURES

1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified herein shall be representative of the volume and nature of the monitored discharge, and shall be taken after treatment and prior to mixing with uncontaminated storm water runoff or the receiving stream.

2. Sampling Frequency

If there is a discharge from a permitted outfall on any given day during the monitoring period, the permittee must sample and report the results of analyses accordingly, and the permittee should not mark the 'No Discharge' box on the Discharge Monitoring Report form.

The permittee should mark the 'No Discharge' box on the Discharge Monitoring Report form only if a permitted outfall does not discharge at any time during the monitoring period. If the outfall discharges effluent at any time during the monitoring period, the permittee must provide at least one sampling result from the effluent of that outfall.

3. Test Procedures

a. Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304 (h) of the Clean Water Act (the "Act"), as amended, under which such procedures may be required.

b. Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR Part 136, as amended, promulgated pursuant to Section 304 (h) of the Act.

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;

- b. The exact person(s) collecting samples;
- c. The dates and times the analyses were performed;
- d. The person(s) or laboratory who performed the analyses;
- e. The analytical techniques or methods used, and;
- f. The results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation shall be retained for a minimum of three (3) years, or longer, if requested by the Division of Water Pollution Control.

C. DEFINITIONS

The **Daily Maximum Concentration** is a limitation on the average concentration, in milligrams per liter (mg/L), of the discharge during any calendar day. When a proportional-to-flow composite sampling device is used, the daily concentration is the concentration of that 24-hour composite; when other sampling means are used, the daily concentration is the arithmetic mean of the concentrations of equal volume samples collected during any calendar day or sampling period.

The **Monthly Average Concentration**, a limitation on the discharge concentration, in milligrams per liter (mg/L), is the arithmetic mean of all daily concentrations determined in a one-month period. For the purpose of this definition, a frequency of 2/Month is representative of 2 separate daily samples, each sample having been collected on a separate day during the monitoring period.

The **Daily Maximum Amount**, is a limitation measured in pounds per day (lb/day), on the total amount of any pollutant in the discharge by weight during any calendar day.

The **Instantaneous Concentration** is a limitation on the concentration, in milligrams per liter (mg/L), of any pollutant contained in the discharge determined from a grab sample taken at any point in time.

A **Grab Sample**, for the purposes of this permit, is defined as a single effluent sample of at least 100 milliliters (sample volumes <100 milliliters are allowed when specified per standard methods, latest edition) collected at a randomly selected time over a period not exceeding 15 minutes. The sample(s) shall be collected at the period(s) most representative of the total discharge.

For the purpose of this permit, a **Calendar Day** is defined as any 24-hour period.

For the purpose of this permit, a **Quarter** is defined as any one of the following three month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, or October 1 through December 31.

D. REPORTING

1. Monitoring Results

Monitoring results shall be recorded monthly and submitted monthly using Discharge Monitoring Report (DMR) forms supplied by the Division of Water Pollution Control. Submittals shall be postmarked no later than 15 days after the completion of the reporting period. The top two copies of each report are to be submitted. A copy should be retained for the permittee's files. DMRs and any communication regarding compliance with the conditions of this permit must be sent to:

**TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION
DIVISION OF WATER POLLUTION CONTROL
COMPLIANCE REVIEW SECTION
401 CHURCH STREET
L & C ANNEX 6TH FLOOR
NASHVILLE TN 37243-1534**

The first DMR is due on the fifteenth of the month following permit effectiveness.

DMRs and any other information or report must be signed and certified by a responsible corporate officer as defined in 40 CFR 122.22, a general partner or proprietor, or a principal municipal executive officer or ranking elected official, or his duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.

The electronic submission of DMRs will be accepted only if approved in writing by the division. For purposes of determining compliance with this permit, data submitted in electronic format is legally equivalent to data submitted on signed and certified DMR forms.

2. Additional Monitoring by Permittee

If the permittee monitors any pollutant specifically limited by this permit more frequently than required at the location(s) designated, using approved analytical methods as specified herein, the results of such monitoring shall be included in the calculation and reporting of the values required in the DMR form. Such increased frequency shall also be indicated on the form.

3. Falsifying Results and/or Reports

Knowingly making any false statement on any report required by this permit or falsifying any result may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act, as amended, and in Section 69-3-115 of the Tennessee Water Quality Control Act.

4. Outlier Data

Outlier data include analytical results that are probably false. The validity of results is based on operational knowledge and a properly implemented quality assurance program. False

results may include laboratory artifacts, potential sample tampering, broken or suspect sample containers, sample contamination or similar demonstrated quality control flaw.

Outlier data are identified through a properly implemented quality assurance program, and according to ASTM standards (e.g. Grubbs Test, 'h' and 'k' statistics). Furthermore, outliers should be verified, corrected, or removed, based on further inquiries into the matter. If an outlier was verified (through repeated testing and/or analysis), it should remain in the preliminary data set. If an outlier resulted from a transcription or similar clerical error, it should be corrected and subsequently reported.

Therefore, only if an outlier was associated with problems in the collection or analysis of the samples and as such does not conform with the Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 CFR §136), it can be removed from the data set and not reported on the Discharge Monitoring Report forms (DMRs). Otherwise, all results (including monitoring of pollutants more frequently than required at the location(s) designated, using approved analytical methods as specified in the permit) should be included in the calculation and reporting of the values required in the DMR form. You are encouraged to use "comment" section of the DMR form (or attach additional pages), in order to explain any potential outliers or dubious results.

E. SCHEDULE OF COMPLIANCE

Full compliance and operational levels shall be attained from the effective date of this permit.

PART II

A. GENERAL PROVISIONS

1. Duty to Reapply

Permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Pollution Control (the "Director") no later than 180 days prior to the expiration date. Such applications must be properly signed and certified.

2. Right of Entry

The permittee shall allow the Director, the Regional Administrator of the U.S. Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials:

- a.** To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;

- b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and
- c. To sample at reasonable times any discharge of pollutants.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Water Pollution Control Act, as amended, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Pollution Control. As required by the Federal Act, effluent data shall not be considered confidential.

4. Proper Operation and Maintenance

a. The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.

b. Dilution water shall not be added to comply with effluent requirements to achieve BCT, BPT, BAT and or other technology-based effluent limitations such as those in State of Tennessee Rule 1200-4-5-.09.

5. Treatment Facility Failure

The permittee, in order to maintain compliance with this permit, shall control production, all discharges, or both, upon reduction, loss, or failure of the treatment facility, until the facility is restored or an alternative method of treatment is provided. This requirement applies in such situations as the reduction, loss, or failure of the primary source of power.

6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

7. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

8. Other Information

If the permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, then he shall promptly submit such facts or information.

B. CHANGES AFFECTING THE PERMIT

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- a.** The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
- b.** The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

2. Permit Modification, Revocation, or Termination

- a.** This permit may be modified, revoked and reissued, or terminated for cause as described in 40 CFR 122.62 and 122.64, Federal Register, Volume 49, No. 188 (Wednesday, September 26, 1984), as amended.
- b.** The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit.
- c.** If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established for any toxic pollutant under Section 307(a) of the Federal Water Pollution Control Act, as amended, the Director shall modify or revoke and reissue the permit to conform to the prohibition or to the effluent standard, providing that the effluent standard is more stringent than the limitation in the permit on the toxic pollutant. The permittee shall comply with these effluent standards or prohibitions within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified or revoked and reissued to incorporate the requirement.
- d.** The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition.

3. Change of Ownership

This permit may be transferred to another party (provided there are neither modifications to the facility or its operations, nor any other changes which might affect the permit limits and conditions contained in the permit) by the permittee if:

- a.** The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;
- b.** The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and
- c.** The Director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

Pursuant to the requirements of 40 CFR 122.61, concerning transfer of ownership, the permittee must provide the following information to the division in their formal notice of intent to transfer ownership: 1) the NPDES permit number of the subject permit; 2) the effective date of the proposed transfer; 3) the name and address of the transferor; 4) the name and address of the transferee; 5) the names of the responsible parties for both the transferor and transferee; 6) a statement that the transferee assumes responsibility for the subject NPDES permit; 7) a statement that the transferor relinquishes responsibility for the subject NPDES permit; 8) the signatures of the responsible parties for both the transferor and transferee pursuant to the requirements of 40 CFR 122.22(a), "Signatories to permit applications"; and, 9) a statement regarding any proposed modifications to the facility, its operations, or any other changes which might affect the permit limits and conditions contained in the permit.

4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

C. NONCOMPLIANCE

1. Effect of Noncompliance

All discharges shall be consistent with the terms and conditions of this permit. Any permit noncompliance constitutes a violation of applicable State and Federal laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

2. Reporting of Noncompliance

a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the Division of Water Pollution Control in the appropriate regional Field Office within 24-hours from the time the permittee becomes aware of the circumstances. (The regional Field Office should be contacted for names and phone numbers of environmental response personnel).

A written submission must be provided within five calendar days of the time the permittee becomes aware of the circumstances, unless this requirement is waived by the Director on a case-by-case basis. The permittee shall provide the Director with the following information:

- i. A description of the discharge and cause of noncompliance;
- ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and
- iii. The steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b. Scheduled Reporting

For instances of noncompliance which are not reported under subparagraph 2.a. above, the permittee shall report the noncompliance on the Discharge Monitoring Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

3. Sanitary Sewer Overflow

- a. "**Sanitary Sewer Overflow**" means the discharge to land or water of wastes from any portion of the collection, transmission, or treatment system other than through permitted outfalls.
- b. Sanitary Sewer Overflows are prohibited.
- c. The permittee shall operate the collection system so as to avoid sanitary sewer overflows. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic sanitary sewer overflows (greater than 5 events per year) or would otherwise overload any portion of the system.
- d. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design,

flows potentially added from new connections and line extensions upstream of any chronic overflow point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment to a Monthly Operating Report submitted to the regional TDEC Field Office. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

- e. In the event that more than five (5) sanitary sewer overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Pollution Control field office staff to petition for a waiver based on mitigating evidence.

4. Upset

a. "**Upset**" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

- i. An upset occurred and that the permittee can identify the cause(s) of the upset;
- ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
- iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and
- iv. The permittee complied with any remedial measures required under "Adverse Impact."

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the permittee 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.

6. Bypass

- a. "**Bypass**" is the intentional diversion of wastewater away from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- b. Bypasses are prohibited unless the following 3 conditions are met:
 - i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
 - ii. There are not feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass, which occurred during normal periods of equipment down-time or preventative maintenance;
 - iii. The permittee submits notice of an unanticipated bypass to the Division of Water Pollution Control in the appropriate environmental assistance center within 24-hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the Director, if possible, at least 10 days before the date of the bypass.
- c. Bypasses not exceeding limitations are allowed **only** if the bypass is necessary for essential maintenance to assure efficient operation. All other bypasses are prohibited. Allowable bypasses not exceeding limitations are not subject to the reporting requirements of 6.b.iii, above.

7. Washout

- a. For domestic wastewater plants only, a "washout" shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30.00% or more. This refers to the MLSS in the aeration basin(s) only. This does not include MLSS decrease due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to infiltration and inflow.
- b. A washout is prohibited. If a washout occurs the permittee must report the incident to the Division of Water Pollution Control in the appropriate regional Field Office within 24-hours by telephone. A written submission must be provided within 5 days. The washout must be noted on the discharge monitoring report. Each day of a washout is a separate violation.

D. LIABILITIES

1. Civil and Criminal Liability

Except as provided in permit conditions for "**Bypassing**," "**Overflow**," and "**Upset**," nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or the Federal Water Pollution Control Act, as amended.

PART III

OTHER REQUIREMENTS

A. TOXIC POLLUTANTS

The permittee shall notify the Division of Water Pollution Control as soon as it knows or has reason to believe:

1. That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis, of any toxic substance(s) (listed at 40 CFR 122, Appendix D, Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

- a. One hundred micrograms per liter (100 ug/l);
 - b. Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
 - c. Five (5) times the maximum concentration value reported for that pollutant(s) in the permit application in accordance with 122.21(g)(7); or
 - d. The level established by the Director in accordance with 122.44(f).
2. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
- a. Five hundred micrograms per liter (500 ug/l);
 - b. One milligram per liter (1 mg/L) for antimony;
 - c. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 122.21(g)(7); or
 - d. The level established by the Director in accordance with 122.44(f).

B. REOPENER CLAUSE

If an applicable standard or limitation is promulgated under Sections 301(b)(2)(C) and (D), 304(B)(2), and 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.

C. PLACEMENT OF SIGNS

Within sixty (60) days of the effective date of this permit, the permittee shall place and maintain a sign(s) at each outfall and any bypass/overflow point in the collection system. For the purposes of this requirement, any bypass/overflow point that has discharged five (5) or more times in the last year must be so posted. The sign(s) should be clearly visible to the public from the bank and the receiving stream or from the nearest public property/right-of-way, if applicable. The minimum sign size should be two feet by two feet (2' x 2') with one inch (1") letters. The sign should be made of durable material and have a white background with black letters.

The sign(s) are to provide notice to the public as to the nature of the discharge and, in the case of the permitted outfalls, that the discharge is regulated by the Tennessee Department of Environment and Conservation, Division of Water Pollution Control. The following is given as an example of the minimal amount of information that must be included on the sign:

TREATED INDUSTRIAL WASTEWATER
Nuclear Fuel Services
(Permittee's Phone Number)
NPDES Permit NO. TN0002038
TENNESSEE DIVISION OF WATER POLLUTION CONTROL
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Johnson City

D. ANTIDegradation

Pursuant to the Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-4-3-.06, titled "Tennessee Antidegradation Statement," and in consideration of the Department's directive in attaining the greatest degree of effluent reduction achievable in municipal, industrial, and other wastes, the permittee shall further be required, pursuant to the terms and conditions of this permit, to comply with the effluent limitations and schedules of compliance required to implement applicable water quality standards, to comply with a State Water Quality Plan or other State or Federal laws or regulations, or where practicable, to comply with a standard permitting no discharge of pollutants.

ADDENDUM TO RATIONALE
Nuclear Fuel Services
PERMIT NO. TN0002038

June 16, 2006

Addendum prepared by: Miss Julie Harse

The facility submitted a comment letter dated May 4, 2006. The paragraphs listed below are the division's response.

Comment #1 - NFS requests that the existing maximum daily Nitrite-Nitrate limit of 558 lb/day be retained in the new permit.

Response – A review of the historical nitrite-nitrate limit for this permit determined that a daily maximum limit of 650 lb/day was established in the March 29, 1996 permit issuance and 558 lb/day established in the August 31, 2000 permit issuance. The poundage limits were calculated on a planning concentration limit of 3000 mg/L and the average daily flow rate at the facility.

Our draft permit proposed a daily average limit of 375 lbs/day and a monthly average limit of 250 lbs/day of nitrite-nitrate. The maximum daily limit was established first and then the daily average limit was calculated based on the commonly used premise that for a well operated treatment facility the average is 67% of the daily maximum. However, we now agree that the monthly average limit is not necessary and it will be dropped from the permit. This is because the treatment system treats individual batches of wastewater, each of which can differ in quantity and nitrite-nitrate concentration.

In regards to the proposed daily maximum limit of 375 lb/day, the comment letter provided 544 daily data points that contained seven values that would have exceeded the proposed daily maximum limit of 375 lb/day. We have reviewed the nitrite-nitrate data submitted in the comment letter, the daily monitoring data submitted to the DEEMER's program and the data provided in the 2005 application. The data submitted electronically to the DEEMER's program (see attached tables) gives an average daily flow rate of 0.0141 MGD with all nitrite-nitrate values below the proposed daily maximum limit of 375 lb/day. The DEEMER's average daily flow rate is consistent with the average flow rate listed in the 2005 application (0.0144 MGD). Since the limits in this permit are based on the permit writer's best professional judgment and the antibacksliding regulatory requirement, a statistical analysis utilizing the EPA document 505/2-90-001 titled "Technical Support Document for Water Quality-based Toxics Control" was performed on the comment letter's nitrite-nitrate data (see below). The results of the analysis demonstrate that the 95th percentile was 186 lb/day and the 99th percentile was 420 lb/day. Since 420 lb/day includes ninety-nine percent of the expected results, accounts for an average flow rate that is fifteen percent higher than the application average flow rate (assuming a maximum of 3000 mg/l nitrite-nitrate), and is based on an accepted EPA calculation methodology, we believe it is appropriate for this permit. Thus we propose that the new permit have a daily maximum limit of 420 lb/day nitrite-nitrate.

EPA Document 505/2-90-001 Page E-15
Daily Maximum Permit Limit Calculations With All Measurements Greater Than Detection Limit

X_i	=	Daily Pollutant Measurement I	X_i	=	See Data
Y_i	=	$\ln(X_i)$	Y_i	=	See Data
K	=	sample size of data set	K	=	544
μ_y	=	$\sum(y_i)/k$	μ_y	=	3.27
σ_y^2	=	$\sum[(y_i - \mu_y)^2]/(k-1)$	σ_y^2	=	1.42
$X_{.95}$	=	$e^{(\mu_y + 1.645\sigma_y)}$	$X_{.95}$	=	186 lb/day
$X_{.99}$	=	$e^{(\mu_y + 2.326\sigma_y)}$	$X_{.99}$	=	420 lb/day

Comment #2 – The facility questioned the calculation method of the monthly average concentration in the DEEMER's database program.

Response – The monthly average value for a pollutant is calculated by totaling the reported values and dividing by the number of reported samples. The two exceptions to this process are flow and coliform pollutants. The monthly average for coliform pollutants is based on the geometric mean instead of the arithmetic average. The average flow rate for batch discharges is based on totaling the flow and dividing by thirty days. The flow is based on thirty days for permitting fee purposes only. Zeros should be entered for flow on days with no discharge to get a monthly average. If you have a specific question on using the DEEMER's program or believe that a computer error was made, you will need to contact Brent Lecher at (615) 532-1171.

Comment #3 – The draft permit requires the first DMR to be due on the fifteenth of the month following permit effective date. NFS requests that the first DMR under the revised permit not be due until after a complete month of sampling data has been collected and analyzed.

Response – The language requiring the first DMR be due on the fifteenth of the month is standard language for all of our individual permits. Since the draft permit is a renewal and no new pollutants have been added to the new permit, the facility should already be on a sampling schedule that will not be different in the new permit. The first DMR will be due on the fifteenth of the month following permit effective date.

Comment #4 – NFS accepts the definition of outlier data.

Response – The comment is noted in the record.

Comment #5 – The official contact should be changed from Ms. Janice Green to Mr. Robert Holley.

Response – The official contact will be changed to Mr. Robert Holley.

Comment #6 – The facility is commenting on the new permit limits and monitoring section on pages R2-R3. It is concerned that smaller dischargers will be penalized when the allowable loading is allocated to the various facilities on a receiving stream.

Response – The process of issuing NPDES permits has evolved to the stage of grouping permits by watershed. The purpose of grouping dischargers by watershed is to review the total

amount of pollutants being discharged to the stream. Since the facility discharges next to a major municipal wastewater treatment plant that receives wastewater from several industrial facilities including NFS, NFS's limits will not be reviewed independent of other dischargers.

RATIONALE

Nuclear Fuel Services
NPDES PERMIT NO. TN0002038
Erwin, Unicoi County, Tennessee

Permit Writer: Miss Julie Harse

I. DISCHARGER

Nuclear Fuel Services
1205 Banner Hill Road
Erwin, Unicoi County, Tennessee

Official Contact Person:
Ms. Janice Greene
Environmental Safety Manager
(423) 743-1730

Nature of Business:
Nuclear fuel manufacturing and uranium recovery facility. Also conducts decommissioning/remediating and groundwater treatment activities related to past activities.

SIC Code(s): 2819
Industrial Classification: Primary
Discharger Rating: Major

PRIMARY INDUSTRY CATEGORY means any industry category listed in the NRDC Settlement Agreement (Natural Resources Defense Council v. Train, 8 ERC 2120 [D.D.C. 1976], modified 12 ERC 1833 [D.D.C. 1979]).

II. PERMIT STATUS

Issued August 31, 2000
Expired August 31, 2005
Application for renewal received 3/21/2005

Watershed Scheduling

Environmental Field Office: Johnson City
Primary Longitude: -82.433889 Primary Latitude: 36.133611
Hydrocode: 6010108 Watershed Group: 5
Watershed Identification: Nolichucky
Target Reissuance Year: 2010

III. FACILITY DISCHARGES AND RECEIVING WATERS

Nuclear Fuel Services discharges wastewater from fenton's treatment process, laboratory facilities, laundry facilities, fuel production facilities, low enriched radioactive operations, high enriched radioactive recovery operations, fuel development operations and miscellaneous activities through Outfall 001 to Nolichucky River at mile 94.6. During the previous permit period, the facility consistently marked no discharge on the sampling reports for Outfall 002. The permit renewal application did not include the required paperwork for Outfall 002; therefore the new permit will not provide coverage for Outfall 002. Appendix 1 summarizes facility discharges and the receiving stream information for Outfall 001.

IV. APPLICABLE EFFLUENT LIMITATIONS GUIDELINES

The federal effluent guidelines are not applicable to the discharge from this facility. The effluent characteristic monitoring requirements will be based on the permit writer's best professional judgment, the state's drinking water standards, and the state's water quality criteria.

V. PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS

Appendix 2 lists the permit limitations and monitoring requirements as defined in the previous permit.

VI. HISTORICAL MONITORING AND INSPECTION

During the previous permit term, Nuclear Fuel Services did not have any appreciable difficulty in meeting effluent limitations as outlined in the previous permit. A summary of the data reported on Discharge Monitoring Report forms during the previous permit term is summarized in Appendix 3.

During the previous permit term, the Division's personnel from the Environmental Field Office- Johnson City performed two Compliance Evaluation Inspections (CEI) at the Nuclear Fuel Services facility. The CEIs were performed by on Steve Lane on June 20, 2001 and June 25, 2003. The two inspections did not note any deficiencies.

VII. NEW PERMIT LIMITS AND MONITORING REQUIREMENTS

The proposed new permit limits have been selected by determining a technology-based limit and evaluating if that limit protects the water quality of the receiving stream. If the technology-based limit would cause violations of water quality, the water quality-based limit is chosen. The technology-based limit is determined from EPA effluent limitations guidelines if

applicable (see Part IV); or from State of Tennessee maximum effluent limits for effluent limited segments per Rule 1200-4-5-.03(2); or by way of operational and/or treatability data. Furthermore, effluent limitations in this permit must comply with any approved Total Maximum Daily Load (TMDL) studies. Appendix 4 lists all proposed effluent limitations and monitoring requirements to be included in the new permit. Note that in general, the term “anti-backsliding” refers to a statutory provision that prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains effluents limits, permit conditions, or standards that are less stringent than those established in the previous permit.

In assessing the stream capacity for various pollutants, the cumulative effect of multiple dischargers in close proximity must be considered in the analysis. The facility discharges to the Nolichucky River at mile 94.6 and the Erwin STP discharges at mile 94.4. The application for the Erwin STP (September 2005) listed the below industries as sending process wastewater to the plant. In addition to these two facilities, there are additional facilities that discharge to North Indian Creek and Martin Creek (state and national fish hatcheries, Hoover Precision Products). The effect of certain pollutants such as BOD5 can be assimilated to the receiving stream with no effect to the downstream segment. Other pollutants such as metals have a cumulative depository effect to the receiving stream downstream segment. The water quality calculations for pollutants that have a depository effect are analyzed through the use of a mass balance load analyze located in Appendix 4a. The calculations for the parameters where the stream has the ability to recover (volatiles, ammonia, nitrate-nitrite) will include the flow rate discharge from the Erwin STP and Nuclear Fuel Services. The receiving stream concentration for hardness in the water quality calculations will be 25 mg/L expressed as calcium carbonate. The concentration is consistent with the value used in the Erwin STP permit calculations (25 mg/L) and the division’s instream sampling (28 mg/L average). It should also be noted that the receiving stream is classified for domestic water supply in the water pollution regulations. The concentration standard’s in the water pollution regulations are taken from the state’s drinking water standards that are based on 40 CFR 141.

Erwin STP Industrial Facilities	
Industry Name	Process Wastewater Average Flow Rate (MGD)
Vesuvius	0.0552
CSX Transportation	0.0268
NN Ball and Roller	0.0440
Framatome	0.0075
Nuclear Fuel Services	0.1047
Specialty Tires of America	0.0226
Total	0.2608

Flow

Monitoring of flow quantifies the load of pollutants to the stream. Flow shall be reported in Million Gallons per Day (MGD) and monitored at the time of sample collection.

pH

According to the State of Tennessee Water Quality Standards [Chapter 1200-4-3-.03(3) (b)], the receiving stream pH for the protection of Fish and Aquatic Life shall lie within the range of 6.5 to 9.0 for larger rivers and shall not fluctuate more than 1.0 unit in this range over a period of 24-hours. The Erwin STP permit limits the effluent to a pH range of 6.5 to 9.0. The

permit for Nuclear Fuel Services limits the pH to a range of 6.0 to 9.0. In order to demonstrate that the expanded pH range for Nuclear Fuel Services will not cause the receiving stream to have a pH outside of the range of 6.5 to 9.0, the calculation below demonstrates the most conservative scenario. The scenario assumes that the receiving stream and Erwin STP have a pH of 6.5 and the effluent from Nuclear Fuel Services has a pH of 6.0 and that no buffering capacity exists in the stream. The downstream calculated pH of 6.49989 combined with the knowledge that pH buffering does take place in the stream demonstrates that the effluent from Nuclear Fuel Services will not cause a violation in water quality for pH. It should be noted that the results of the division's instream sampling produced an average pH value of 7.5. The sample type will be grab and the monitoring frequency will be once per batch.

Parameter	Nolichucky River Upstream	Nuclear Fuel Services	Erwin STP
Flow Rate (MGD)	122.8	0.0144	1.9
pH	6.5	6	6.5

$10^{-(pH)}$ g/L	X	1 mol H^+ / 1 g H+	X	1 Liter / 0.264172 Gall	X	$1,000,000 \text{ Gall}$ / 1 MGD	X	Flow MGD	=	Moles H+
$10^{-(6.5)}$ g/L	X	1 mol H^+ / 1 g H+	X	1 Liter / 0.264172 Gall	X	$1,000,000 \text{ Gall}$ / 1 MGD	X	122.8 MGD	=	146.998 Nolichucky River Upstream Moles H+
$10^{-(6.0)}$ g/L	X	1 mol H^+ / 1 g H+	X	1 Liter / 0.264172 Gall	X	$1,000,000 \text{ Gall}$ / 1 MGD	X	0.0144 MGD	=	0.0545 Nuclear Fuel Services Moles H+
$10^{-(6.5)}$ g/L	X	1 mol H^+ / 1 g H+	X	1 Liter / 0.264172 Gall	X	$1,000,000 \text{ Gall}$ / 1 MGD	X	1.9 MGD	=	2.2744 Nuclear Fuel Services Moles H+

(Nolichucky River Upstream Moles H+) + (Nuclear Fuel Services Moles H+) + (Erwin STP Moles H+) = **Total Moles H+**
 146.998 Moles + 0.0545 Moles + 2.2744 Moles = **149.3269 Moles H+**

- log	$\frac{\text{Total Moles H}^+ \times [1 \text{ g H}^+ / 1 \text{ mol H}^+]}{\text{Total Flow MGD} \times 1,000,000 \times [1 \text{ Liter} / 0.264172 \text{ Gall}]}$	=	Downstream pH
- log	$\frac{149.3269 \text{ Moles H}^+ \times [1 \text{ g H}^+ / 1 \text{ mol H}^+]}{124.7144 \text{ MGD} \times 1,000,000 \times [1 \text{ Liter} / 0.264172 \text{ Gall}]}$	=	6.49989

Total Suspended Solids (TSS)

Total Suspended Solids is a general indicator of the quality of a wastewater and will be limited in this permit. The State of Tennessee Water Quality Standards for the protection of Fish & Aquatic Life [Chapter 1200-4-3-.03(3) (c)] state there shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to fish and aquatic life in the receiving stream.

The previous permit's limits will be retained in the new permit based on the anti-backsliding requirements. Considering the nature of wastewater collection and discharge system, the sample type will be grab and the monitoring frequency will be once per batch.

Settleable Solids

Settleable solids is a test that measures the amount of solids that will settle from quiescent wastewater. Wastewater that is adequately treated for solids removal should not produce significant amounts of sediment. The previous permit limit will be retained in the new permit based on the anti-backsliding requirement. The sample type will be grab and the monitoring frequency will once per batch.

Total Residual Chlorine

In a letter dated May 16, 2001, Nuclear Fuel Services notified the division that the chlorination system had been removed from the treatment process. The letter stated that any chlorine treatment in the future would be conducted through the use of portable chlorine cylinders. At the time of the letter, the facility was proposing to install treatment capability based on the Fenton method that utilizes an oxidation process to break down organic pollutants.

Wastewater treatment with chlorine involves mixing chlorine gas with water to produce free available chlorine (HOCl and OCl⁻). The free available chlorine reacts with certain pollutants including bacteria and also ammonia that converts the free available chlorine to chloramines. The amount of chlorine converted to chloramines is based on the contact time, pH and temperature of the wastewater. A properly designed system will maximize the breakdown and disinfection of pollutants and minimize the free available chlorine at the exit of the treatment system. The total residual chlorine concentration of 2 mg/L at the treatment system exit is an obtainable design parameter that is consistently applied to NPDES permits. The discharge monitoring reports did not provide any sampling data that would support TRC being used on a regular basis. The daily maximum concentration permit limit of 2 mg/L will be applied based on the permit writer's judgment of reasonable treatment. The testing for TRC will only be required when chlorine is utilized in the treatment process.

Chemical Oxygen Demand

Measurement of COD is an indicator of the oxygen demanding compounds present in the discharge, and the efficiency of the treatment system. The previous permit had a daily maximum concentration limit of 370 mg/L. The discharge monitoring reports had a maximum daily concentration of 370 mg/L and a permit average daily maximum concentration of 305 mg/L. The permit application maximum daily value ratio for BOD/COD was 0.54 (136/251.5). Converting the COD limit of 370 mg/L to BOD results in a value of 200 mg/L. The resulting poundage from this concentration is 24 lb/day (200 mg/L X 8.34 X 0.0144 MGD). The daily maximum poundage for the Erwin STP is 713 lb/day (45 mg/L X 8.34 X 1.9 MGD). The poundage for Nuclear Fuel Services is 3.2% of the total load (24/(24+713)). It is the permit writer's best professional judgment that the previous daily maximum concentration limit is reasonable, therefore the previous permit limit will be retained in the new permit.

Nitrite plus Nitrate

The previous permit rationale stated that a letter dated February 26, 1990 from A.L. Fulkerson in the Johnson City Environmental Field Office provided planning limits based on a concentration of 3000 mg/L in a batch flow of 15,000 gpd. The poundage calculation from the planning numbers is 375.3 lb/day (see below). The previous permit had a daily maximum amount limit of 558 lb/day. The facility had one permit violation of 620 lb/day (August 2003). Excluding the permit violation, the facility had a daily maximum amount of 295 lb/day and an average daily maximum amount of 128 lb/day.

$$8.34 \times 0.015 \text{ MGD} \times 3000 \text{ mg/L} = 375.3 \text{ lb/day}$$

The facility discharges to a receiving stream that is classified for domestic water supply and the maximum contaminate level for nitrate-nitrite is the drinking water standard of 10 mg/L (TN Rule 1200-5-1-.06(1)(b)). The division's instream sampling upstream of the facilities

produced an average background concentration of 0.37 mg/L. The mass balance of the Nuclear Fuel Services facility and the Erwin STP results in an allowable effluent poundage of 10020 lb/day (see below calculations). Using the ratio of effluent flows results in Nuclear Fuel Services receiving 75.4 lb/day and the Erwin STP receiving 9944.6 lb/day. Since the nutrient concentrations in the Erwin STP application are well below their poundage allowance, the new permit for Nuclear Fuel Services will allow the planning limits that are above the facility's percent allocation. The ratio of 1.5 between monthly and daily maximum amounts is consistent with biological wastewater treatment plant limitations. The new permit will require the reporting of monthly and daily maximum concentrations. The monthly poundage amount will be 250 lb/day and the daily maximum amount will be 375 lb/day.

$$\text{Up. Conc. mg/L} \times \text{Up Flow Rate MGD} + \text{Eff. Conc. mg/L} \times \text{Discharge Flow MGD} \\ = \text{Instream Conc. mg/L} \times \text{Down. Flow MGD}$$

$$0.37 \text{ mg/L} \times 8.34 \times 122.8 \text{ MGD} + \text{Conc.} \times 8.34 \times (1.9 \text{ MGD} + 0.0144 \text{ MGD}) = 10 \text{ mg/L} \times 8.34 \times 124.7 \text{ MGD}$$

$$627.6 \text{ mg/L} = \text{Effluent Concentration for Nuclear Fuel Services and Erwin STP}$$

$$627.6 \text{ mg/L} \times 8.34 \times 1.9144 \text{ MGD} = 10020 \text{ lb/day}$$

$$10020 \text{ lb/day} = \text{Total Poundage Allowed for Facilities}$$

$$10020 \text{ lb/day} (0.0144 \text{ MGD}/1.9144 \text{ MGD}) = 75.4 \text{ lb/day for Nuclear Fuel Services}$$

$$10020 \text{ lb/day} (1.9 \text{ MGD}/1.9144 \text{ MGD}) = 9944.6 \text{ lb/day for Erwin STP}$$

Ammonia as N

The previous permit limited ammonia with a monthly average concentration of 20 mg/L and a daily maximum concentration of 30 mg/L. In analyzing the ammonia limit, the two issues of concern are ammonia toxicity and reduction of dissolved oxygen in the receiving stream. The question of ammonia toxicity is resolved through the temperature and pH calculations that are based on a 1999 EPA document (see chart below). The below calculations demonstrate that ammonia toxicity will not exist even for the combined flow rate of Nuclear Fuel Services and Erwin STP (1.9144 MGD). The question of reduction of dissolved oxygen can be resolved by determining an estimate of the instream ammonia concentration. An estimated instream ammonia concentration is 0.23 mg/L (see below). The division's sampling for dissolved oxygen resulted in an average D.O. concentration of 10.2 mg/L and the instream minimum dissolved oxygen concentration requirement is 7.0 mg/L. It is the permit writer's best professional judgment that the previous permit limits are protective of instream water quality criteria and will be retained in the new permit.

$$20 \text{ mg/L} \times 0.0144 \text{ MGD} \times 8.34 + 15 \text{ mg/L} \times 1.9 \times 8.34 = 240 \text{ lb/day} \\ 240 \text{ lb/day} / (8.34 \times 124.7 \text{ MGD}) = 0.23 \text{ mg/L}$$

Ammonia as Nitrogen Calculations

The State utilizes the EPA document, 1999 Update to Ambient Water Quality Criteria for Ammonia and assumed temperatures of 25°C and 15°C and stream pH of 8 to derive an allowable instream protection value. A mass balance with plant and stream flows and this allowable value determines the monthly average permit limit. Seasonal limits may also be allowed due to ambient temperature variations between the summer and winter seasons.

East TN- 25°C, 15°C
 Middle TN- 27°C, 17°C
 West TN- 30°C, 20°C

A pH value of 8 (instead of historically used 7.5) was chosen for two reasons: 1.) ambient monitoring in west TN showed that a pH often exceeds 7.5, and is up to 8 sometimes 2.) this assumption is more conservative.

Winter	Summer
Temp (°C)= 15	Temp (°C)= 25
pH= 8	pH= 8
Min (2.85, 1.45*10 ^{-0.028*(25-T)})	Min (2.85, 1.45*10 ^{-0.028*(25-T)})
2.76 2.85 2.76	1.45 2.85 1.45

$$CCC = \left(\frac{0.0577}{1+10^{(7.688-pH)}} + \frac{2.487}{1+10^{(pH-7.688)}} \right) * \text{Min} (2.85, 1.45*10^{-0.028*(25-T)})$$

CCC= **2.36** CCC= **1.24**

CCC - Contionuous Chronic Criterion Allowable instream NH3 concentration [mg/l]

$$CCC = \frac{(\text{Critical Low Flow [MGD]} * \text{Background Ammonnia [mg/L]} + (\text{Design Flow [MGD]} * \text{Effluent Concentration [mg/L]})}{(\text{Critical Low Flow [MGD]} + (\text{Design Flow [MGD]})}$$

where: 122.8 Critical Low Flow [MGD] (7Q10 value)
 0.1 Background Ammonnia Concentration [mg/L]
 1.9144 WWTP Design Flow or long-term average flow [MGD]

Therefore, the Allowable **Effluent Concentrations** and corresponding **Amounts** in winter and summer are:

Winter	Summer
147.28 Concentration [mg/L]	74.244 Concentration [mg/L]
2351.5 Amount [lb/day]	1185.4 Amount [lb/day]

Uranium

Uranium is limited in this permit due to the nature of the activities at the facility. The previous permit limited uranium with a daily maximum concentration of 4.0 mg/L and a monthly average concentration of 2.0 mg/L. The receiving stream is classified for domestic water supply and the drinking water standard maximum contaminant level of uranium is 0.030 mg/L (TN Rule 1200-5-1-.06(5)(c)). The total allowable instream poundage amount is 31.2 lb/day (0.03 mg/L X 8.34 X124.7 MGD). The process wastewater poundage for Nuclear Fuel Services is 0.48 lb/day which accounts for less than 2% of the instream load capacity. The new permit will retain the previous permit limits based on the anti-backsliding policy.

Alpha and Beta Particles

The facility discharges wastewater from nuclear fuel manufacturing processes to a receiving stream which is classified for domestic water supply. The previous permit did not require monitoring for the radionuclides alpha and beta.

The state’s drinking water standards (TN Rule 1200-5-1-.06(5)(a)(2)) list the maximum contaminant level for gross alpha particle activity as 15 pCi/L. Assuming the upstream section of the receiving stream and tributaries contains no radionuclides and the instream allowance is given to Nuclear Fuel Services and the Erwin STP, the maximum effluent concentration of gross alpha particle activity is 7410 pCi/L. The application listed a maximum daily value of 339 pCi/L and a long term average of 233.76 pCi/L which is below the allowable level; therefore permit monitoring for alpha particles will not be required in the new permit.

The state's drinking water standards (TN Rule 1200-5-1-.06(5)(b)(1)) list the maximum contaminant level for beta particle and photon radioactivity as 4 millirem/year. The standard is given in the units of millirem/year, however the sampling results for the applicable elements is given in pCi/L. The EPA document titled "Implementation Guidance for Radionuclides (EPA 816-F-00-002)" uses a "sum of the fractions" method to convert from pCi/L to millirem/year. The method requires for each element that emits beta particles the following equation be used to determine the fraction for that element. The fractions of all the elements are totaled and then multiplied by four millirem/year. If the final result is greater than four then the sampled water has exceeded the MCL.

$$\frac{\text{pCi/L found in sample (from laboratory results)}}{\text{exposure limit pCi/L equivalent of 4 mrem of exposure (from conversion table in Appendix I of EPA document)}} = \text{fraction of the maximum 4 mrem/year}$$

In the application, the facility listed the long-term average value for berts as 519.54 pCi/L and gave concentration values in mg/L for the elements that typically emits beta particles. In order to analyze the information, the application data must be converted to millirem/year. Since the sampling data for the elements was not measured in pCi/L, the total berts number will be broken down based on the percentage concentrations for each element.

Name	Application Average Concentration (mg/L)	Total Concentration (mg/L)	% for each pollutant	Total Bets from Application pCi/L	% X 519.54 pCi/L	Largest Exposure Limit from Appendix I of EPA Document	Fraction of 4 millirem/year
Beryllium	0.0002	0.1355	0.001	519.54	0.77	6000	0.000
Manganese	0.0050	0.1355	0.037	519.54	19.17	90	0.213
Iron	0.0770	0.1355	0.568	519.54	295.24	200	1.476
Copper	0.0135	0.1355	0.100	519.54	51.76	900	0.058
Silver	0.0049	0.1355	0.036	519.54	18.79	90	0.209
Cadmium	0.0020	0.1355	0.015	519.54	7.67	90	0.085
Antimony	0.0080	0.1355	0.059	519.54	30.67	60	0.511
Lead	0.0066	0.1355	0.049	519.54	25.31	60	0.422
Thallium	0.0150	0.1355	0.111	519.54	57.51	1000	0.058
Selenium	0.0023	0.1355	0.017	519.54	8.82	900	0.010
Mercury	0.0010	0.1355	0.007	519.54	3.83	60	0.064
Total	0.1355	Total	1.000			Total Fraction	3.105

Total Fraction X 4 millirem/year	3.105	4
Beta Value	12.420	millirem/year

The effluent for the facility is above the instream allowable concentration therefore the following calculation was performed to demonstrate that the amount discharged into the Nolichucky River does not have the potential to violate water quality criteria. The new permit will not require any monitoring for beta particles.

1 rontgen = 2.58 E -4 C/kg
 1 rem = 1 rontgen X biological efficiency of radiation
 Assume 100% Efficiency
 1 rem = 2.58 E -4 C/kg (1) = 2.58 E -4 C/kg
 1 millirem = 1 rem/1000 = 2.58 E -4 C/kg / 1000
 1 millirem = 2.58 E -7 C/kg
 MCL = 4 millirem /year
 MCL = (1.032 E -6 C/kg)/year

Calculation for Receiving Stream Poundage

$$124.7 \frac{\text{MGD}}{\text{Day}} \times 365 \frac{\text{Days}}{\text{Year}} \times \frac{1,000,000 \text{ Gallons}}{1 \text{ MGD}} \times \frac{8.34 \text{ lb}}{1 \text{ Gallon}} \times \frac{0.4536 \text{ kg}}{1 \text{ lb}} = 1.7219 \text{ E } 11 \frac{\text{kg}}{\text{year}}$$

Coulomb per year Receiving Stream
 $1.7219 \text{ E } 11 \frac{\text{kg}}{\text{year}} \times 1.032 \text{ E } -6 \text{ C} = 177700 \text{ Coulomb}$
 kg/year

Calculation for Effluent Poundage

$$0.0144 \frac{\text{MGD}}{\text{Day}} \times 365 \frac{\text{Days}}{\text{Year}} \times \frac{1,000,000 \text{ Gallons}}{1 \text{ MGD}} \times \frac{8.34 \text{ lb}}{1 \text{ Gallon}} \times \frac{0.4536 \text{ kg}}{1 \text{ lb}} = 1.9884 \text{ E } 7 \frac{\text{kg}}{\text{year}}$$

$$1.9884 \text{ E } 7 \text{ kg/year} \times 2.58 \text{ E } -7 \text{ C} \times 12.42 \text{ millirem} = 64 \text{ Coulomb}$$

 kg/year

Allowance for Nuclear Fuel Services is 6% therefore 177700 Coulomb X 0.06 equals 10660 Coulomb

Nuclear Fuel Services emitted 64 Coulomb which is less than 10660 Coulomb

Fluoride, Copper, Chromium, Nickel

Historically this permit has required the sampling of these four pollutants based on the nature of the industrial activities at the site. The parameters are consistent with the EPA documents regarding uranium industrial activities.

The previous permit limited fluoride with values of 15 mg/L for monthly average concentration and 20 mg/L for daily maximum concentration. The receiving stream is classified for domestic water supply and the division of water supply's maximum contaminant level for fluoride is 4 mg/L (TN Rule 1200-5-1-.06(1)(b)). The total instream poundage allowed is 4160 lb/day (4.0 mg/L X 8.34 X 124.7 MGD). The facility daily maximum poundage limit is 2.4 lb/day (0.0144 X 8.34 X 20 mg/L). The previous permit limits will be retained in the new permit based on the antibacksliding policy.

In the discharge monitoring reports, the facility used 10 mg/L as the detection limit for the sampling events. The facility shall use methods published in 40 CFR Part 136 which should have detection limits at or below 0.2 mg/l. Since the facility discharges to a receiving stream that is classified for domestic water supply, the lab analysis shall be conducted with a detection limit below 4 mg/L.

The previous permit limit for copper was 1.0 mg/L for the daily maximum concentration. The mass allocation analysis in Appendix 4a demonstrates that the limit will not violate the

instream water quality criteria, therefore the previous permit limitation will be required in the new permit based on the anti-backsliding requirement.

The previous permit required the reporting of the daily maximum concentration of chromium and nickel on a quarterly basis. The mass allocation analysis demonstrates that the sampled concentrations will not create an instream water quality violation. The parameters will be required in the new permit because they are relative to the industrial activities at the site and the monitoring will report only.

Arsenic, Lead, Mercury, Silver, Cadmium, and Tetrachloroethylene

These parameters are included in the permit based on historical monitoring, treatability, and reasonable potential for contamination.

The domestic water supply instream limitation for arsenic is 0.01 mg/L and discharge monitoring report summary had an average effluent concentration of 0.005 mg/L and a maximum concentration of 0.026 mg/L. It is the permit writer's best professional judgment that the monitoring of this pollutant will be retained in the new permit on a quarterly basis.

The previous permit provided a daily maximum concentration limit of 0.1 mg/L for lead. The previous permit limit will not create a water quality violation based on the mass allocation in Appendix 4a. The previous permit's limit will be retained in the new permit.

The previous permit required a monthly average concentration of 0.00037 mg/L and a daily maximum concentration of 0.05 mg/L for mercury. The previous permit limit will not create a water quality violation based on the mass allocation in Appendix 4a. The new permit will retain the monthly average and daily maximum concentration limits.

The previous permit limits for cadmium and silver will not create a water quality violation based on the mass allocation in Appendix 4a and will be retained in the new permit.

The report only requirement for tetrachloroethylene will be retained in the new permit due to the drinking water standard of 0.005 mg/l.

Zinc

In the previous permit the parameter was report only with a monitoring frequency of once a quarter. The sampling results in appendix three have the below listed average concentration and daily maximum concentration. The mass allocation in Appendix 4 demonstrates that the application concentration poundage and DMR sampling values will not violate water quality. Additionally the secondary drinking water standard for zinc is 5 mg/L. In the new permit, sampling will not be required for this pollutant in the new permit.

Permit Period Average	Permit Period Daily Maximum
0.027 mg/L	0.282 mg/L
0.0032 lb/day	0.034 lb/day

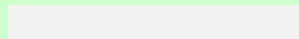
IX. ANTIDegradation

Tennessee's Antidegradation Statement is found in the Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-4-3-.06. This statement outlines the criteria for the two types of high quality waters. Outstanding National Resource Waters (ONRWs), as designated by the Water Quality Control Board, are commonly referred to as Tier 3 waters. Other high quality waters, as identified by the division, are commonly referred to as Tier 2 waters. Other surface waters not specifically identified and/or designated as high quality are referred to as Tier 1 waters. Some Tier 1 waters may be identified by the division as not meeting existing criteria.

The Division has made a stream tier determination of the receiving waters associated with the subject discharge(s) and has found the receiving stream to be neither a Tier 2 nor Tier 3 water. Additionally, this water is fully supporting its designated uses. The Department has maintained, and shall continue to assess, the water quality of the stream to assure that the water quality is adequate to protect the existing uses of the stream fully, and to assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for non-point source control.

X. PERMIT DURATION

The proposed limitations meet the requirements of Section 301(b)(2)(A), (C), (D), (E), and (F) of the Clean Water Act as amended. It is the intent of the division to organize the future issuance and expiration of this particular permit such that other permits located in the same watershed and group within the State of Tennessee will be set for issuance and expiration at the same time. In order to meet the target reissuance date for the Nolichucky watershed and following the directives for the Watershed Management Program initiated in January, 1996, the permit will be issued for a 4 year term.

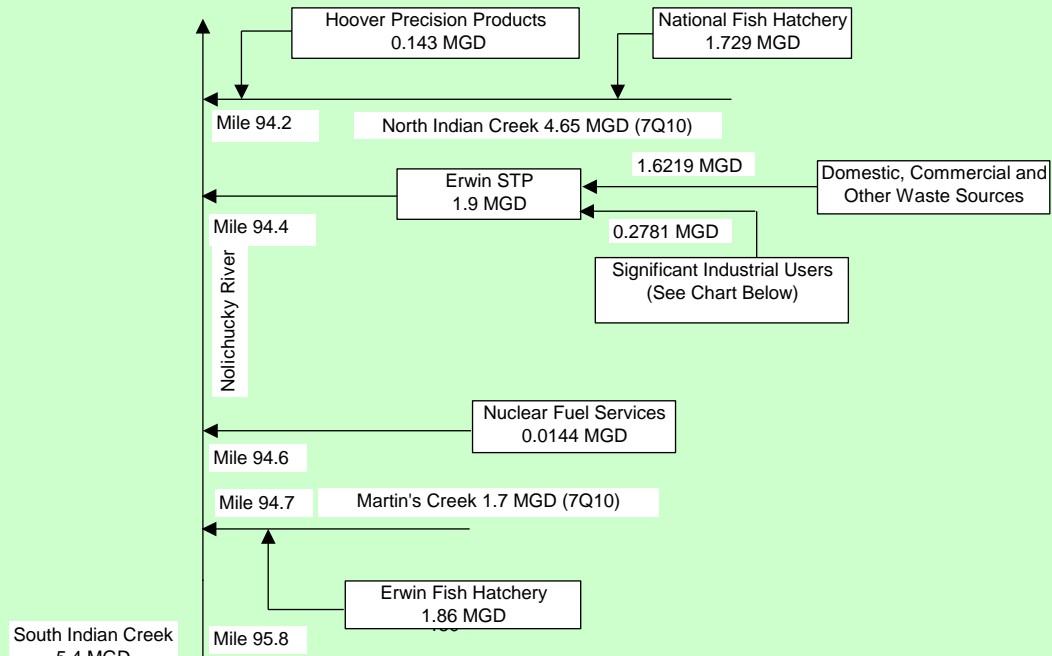


APPENDIX 1

FACILITY DISCHARGES AND RECEIVING WATERS

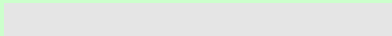
FACILITY DISCHARGES AND RECEIVING WATERS				
OUTFALL 001				
LONGITUDE	LATITUDE			
82-26-00	36-08-06			
FLOW (MGD)	DISCHARGE SOURCE			
0.000050	Fenton's Process Wastewater			
0.001700	Laboratory Facilities			
0.003330	Laundry Facility			
0.004433	Fuel Production Facilities			
0.001402	Low Enriched Radioactive Operation			
0.001250	Miscellaneous			
0.001430	High Enriched Radioactive Recovery Operations			
0.000800	Fuel Development			
0.0144	TOTAL DISCHARGE			
		RECEIVING STREAM		
		DISCHARGE ROUTE		
		Nolichucky River at mile 94.6		
STREAM LOW FLOW (CFS) *		7Q10	1Q10	30Q5
		190.0	NA	275.0
(MGD)		122.8	NA	177.8
STREAM USE CLASSIFICATIONS (WATER QUALITY)				
AQUATIC LIFE	RECREATION	IRRIGATION	LIVESTOCK & WILDLIFE	DOMESTIC WATER SUPPLY
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X				
<p>Treatment: Waste segregation, Ammonia Stripping, Chemical Precipitation, Flocculation, Pressure Filtration Dollinger Filter, Ion Exchange, Neutralization</p>				
<p>* Reference: Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority. Nashville, Tennessee, 1996, p. 123.</p>				

Flow Diagram and Significant Industrial Users List



Erwin STP Significant Industrial Users		
Facility	Process Wastewater (MGD)	Non-Process Wastewater (MGD)
Vesuvius	0.0552	Not Given
CSX Transportation	0.0268	Not Given
NN Ball and Roller	0.0440	Not Given
Framatome	0.0075	Not Given
Hoover Precision Products	0.0000	0.0095
Morrill Motors	0.0000	0.0023
Specialty Tires of America	0.0226	Not Given
Studsvik, Inc.	0.0000	0.0055
Nuclear Fuel Services	0.1047	Not Given
Total	0.2608	0.0173

122.8 MGD



APPENDIX 2

PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS

PERMIT LIMITS						
OUTFALL 001 Process Wastewater						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) *		Report (MGD) *		1/batch	Estimate
pH	Range 6.0 - 9.0**				1/batch	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30	--	40	--	1/batch	Grab
SOLIDS, SETTLEABLE	--	--	0.5 ml/l	--	1/batch	Grab
CHLORINE, TOTAL RESIDUAL (TRC)****	--	--	2.0	--	1/batch	Grab**
COD	--	--	370	--	1/Month	Grab
NITROGEN, AMMONIA TOTAL	20	--	30	--	1/batch	Grab
NITRITE PLUS NITRATE NITROGEN	--	--	--	558	1/batch	Grab
FLUORIDE, Soluble	15	--	20	--	1/batch	Grab
ARSENIC, TOTAL	--	--	Report	--	1/quarter	Grab
CADMIUM, TOTAL	--	--	0.01	--	1/Month	Grab
CHROMIUM, TOTAL	--	--	Report	--	1/quarter	Grab
COPPER, TOTAL	--	--	1.0	--	1/Month	Grab
LEAD, TOTAL	--	--	0.1	--	1/Month	Grab
MERCURY, TOTAL***	0.00037	--	0.05	--	1/batch	Grab
NICKEL, TOTAL	--	--	Report	--	1/quarter	Grab
SILVER, TOTAL	--	--	0.05	--	1/Month	Grab
URANIUM, NATURAL, TOTAL	2.0	--	4.0	--	1/batch	Grab
ZINC, TOTAL	--	--	Report	--	1/quarter	Grab
TETRACHLOROETHYLENE	--	--	Report	--	1/quarter	Grab

* Flow shall be reported in Million Gallons per Batch.
 ** pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.
 *** The chronic mercury limit shall apply only if the discharge of batches containing mercury occur four (4) or more consecutive days/week during the monitoring period; otherwise, only the daily maximum limit for batches containing mercury shall apply. If any individual analytical test result for mercury is less than the minimum quantification level (0.0002 mg/L), then a value of zero (0) may be used for DMR calculations and reporting requirements.
 **** The total residual chlorine limit is only applicable when chlorine is used in the treatment process.

PERMIT LIMITS						
OUTFALL 002						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) *		Report (MGD) *		1/Week	Instantaneous
pH**	Range 6.0 - 9.0				1/Week	Grab
TEMPERATURE, Effluent	Report Effluent Temperature				1/Month	Grab
CHLORINE, TOTAL RESIDUAL (TRC)***	--	--	2.0	--	1/Month	Grab **
IC25	Survival, Reproduction, & Growth in 32.2% Effluent				****	Composite ****

* Flow shall be reported in Million Gallons per Day (MGD).
 ** pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.
 *** The current detection level for Total Residual Chlorine is 0.05 mg/L. The acceptable methods for detection, as specified in 40 CFR Part136, are the amperometric titration, DPD colorimetric, and specific ion electrode. TRC shall be measured only when municipal water is the source of cooling water.
 **** See Part III for methodology and measurement frequency.

APPENDIX 3

HISTORICAL MONITORING AND INSPECTION

Date	Flow		Total Suspended Solids		Ammonia, Total Nitrogen		Soluble Flouride		Total Mercury		Total Natural Uranium		Arsenic	Cadmium
	Monthly Average Amount	Daily Maximum Amount	Monthly Average Conc.	Daily Max. Conc.	Monthly Average Conc.	Daily Max. Conc.	Monthly Average Conc.	Daily Max. Conc.	Monthly Average Conc.	Daily Max. Conc.	Monthly Average Conc.	Daily Max. Conc.	Daily Max. Conc.	Daily Max. Conc.
	MGD	MGD	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
October-00	0.0078	0.0307	4	<10	15	29	<8.8	<10	0	0	<0.09	<0.09		<0.005
November-00	0.0152	0.0155	4	28	18	30	<10	<10			<0.09	<0.09		<0.005
December-00	0.0151	0.0155	8	28	12	25	<9.6	<10			<0.09	<0.09	<0.00257	<0.006
January-01	0.0147	0.0155	7	30	13	19	9.3	<10			0.10	0.2		<0.002
February-01	0.0148	0.0265	3	9	14	22	<10	<10			<0.09	<0.09		<0.004
March-01	0.0148	0.0269	6	20	16	29	<10	<10			0.0001	0.0002	0.0106	<0.006
April-01	0.0150	0.2985	5	11	13	25	<10	<10			0.10	0.2		<0.0096
May-01	0.0145	0.0155	9	24	12	25	9	<10			0.15	0.3		<0.005
June-01	0.0143	0.0154	6	25	11	12	<10	<10			0.17	0.3	<0.00257	<0.004
July-01	0.0146	0.0307	9	24	10	14	<10	<10			0.21	0.4		<0.001
August-01	0.0116	0.0156	6	31	12	29	<10	<10			0.15	0.4		<0.004
September-01	0.0137	0.0150	10	28	11	21	<10	<10			<0.09	<0.09	<0.00257	<0.005
October-01	0.0125	0.0151	5	13	11	17	<10	<10			<0.09	0.09		<0.004
November-01	0.0135	0.0149	8	27	15	24	<10	<10			0.10	0.14		<0.002
December-01	0.0128	0.0154	6	15	13	19	<10	<10			0.18	0.4	<0.00304	<0.002
January-02	0.0136	0.0149	9	24	17	25	<10	<10			0.19	0.6		<0.001
February-02	0.0137	0.0153	7	27	16	22	<10	<10			0.13	0.6		<0.003
March-02	0.0134	0.0149	13	26	17	25	<10	<10			<0.09	<0.09	<0.00257	<0.002
April-02	0.0141	0.0157	4	27	14	24	<10	<10			0.09	0.1		<0.003
May-02	0.0132	0.0152	4	8	14	22	<9.3	<10			<0.09	0.12		<0.002
June-02	0.0137	0.0150	3	12	12	20	<10	<10			<0.09	0.1	0.00317	<0.003
July-02	0.0138	0.0147	7	25	13	22	<10	<10						
August-02	0.0139	0.0149	3	14	14	24	<10	<10			<0.09	<0.09		<0.006
September-02	0.0137	0.0151	8	28	11	23	8	<10			0.09	0.09	0.00211	<0.004
October-02	0.0131	0.0146	3	9	3	15	0.17	2			0.03	0.2	0.00245	0.000
November-02	0.0137	0.0154	6	21	5	22	0	0			0	0		0.000
December-02	0.0137	0.0147	7	15	5	14	0	0			0.01	0.13		0.000
January-03	0.0131	0.0154	6	12	8	24	0	0			0.02	0.2		0.000
February-03	0.0140	0.0155	8	25	13	22	0	0			0.01	0.1	0	0.000
March-03	0.0160	0.0269	3	15	8	25	0	0			0.01	0.1		0.000
April-03	0.0137	0.0151	12	29	3	14	0	0			0.08	1.1	0.00179	0.000
May-03	0.0141	0.0150	11	28	5	20	0	0			0.07	0.7		0.000
June-03	0.0145	0.0153	3	13	6	20	0	0			0.08	0.6		0.000
July-03	0.0142	0.0153	6	13	11	23	0	0			0.04	0.1	0	0.000
August-03	0.0132	0.0277	6	14	14	26	0	0			0.05	0.2		0.001
September-03	0.0145	0.0151	5	26	6	26	0	0			0.07	0.2		0.000
October-03	0.0140	0.0151	3	18	10	24	0	0			0.03	0.2	0.0262	0.000
November-03	0.0135	0.0153	4	24	7	26	0	0			0	0		0.001
December-03	0.0140	0.0184	1	3	7	21	0	0			0	0		0.000
January-04	0.0078	0.0147	2	6	11	26	0	0			0.04	0.35	0	0.000
February-04	0.0142	0.0148	4	14	8	29	1	10			0.10	0.2		0.000
March-04	0.0144	0.0154	4	23	18	24	0.32	2.1			0.12	0.19		0.000
April-04	0.0135	0.0151	3	19	17	27	0.13	1.45			0.18	0.84	0.000	0.000
May-04	0.0146	0.0154	4	19	14	30	0	0			0.06	0.3		0.000
June-04	0.0160	0.0282	4	20	14	25	0	0			0.21	0.7		0.000
July-04	0.0148	0.0155	3	23	13	27	0	0			0.06	0.17	0.000	0.000
August-04	0.0153	0.0299	2	29	14	26	0	0			0.05	0.23		0.000
September-04	0.0159	0.0283	2	16	16	29	0.9	13			0.03	0.21		0.003
October-04	0.0188	0.0307	1	5	13	26	0	0			0.08	0.29	0.000	0.000
November-04	0.0146	0.0155	2	11	4	19	0	0			0.12	0.3		0.000
December-04	0.0126	0.0154	3	12	10	17	0	0			0.11	0.4		0.000
January-05	0.0117	0.0148	3	8	19	30	0.5	5			0.00008	0.0002	0.010	0.000
February-05	0.0141	0.0154	5	23	12	18	<10	<10			0.15	0.32		<0.003
March-05	0.0145	0.0158	2	8	15	28	0	0			0.11	0.2		0.000
April-05	0.0142	0.0151	3	18	13	28	0	0			0.14	0.32		0.000
May-05	0.0145	0.0151	2	17	7	22	0	0			0.12	0.3	0.012	0.000
June-05	0.0143	0.0148	5	16	8	28	0	0			0.01	0.2		0.000
July-05	0.0137	0.0154	3	9	15	27	<10	<10			0.11	0.2		<0.0025
August-05	0.0147	0.0154	1	5	12	26	0	0			0.00023	0.00116		0.000
Standard Dev.	0.0016	0.0369	3	8	4	4	2.4	2.9	0.0002	0.0008	0.06	0.22	0.007	0.001
Minimum	0.0078	0.0146	1	3	3	12	0.0	0.0	0.0000	0.0000	0.00	0.00	0.000	0.000
Maximum	0.0160	0.2985	13	31	19	30	9.3	13.0	0.0002	0.0012	0.21	1.10	0.026	0.003
Average	0.0139	0.0223	5	18	12	23	0.8	1.0	0.0001	0.0006	0.08	0.27	0.005	0.000
Permit Limit	Report	Report	30	40	20	30	15	20	0.00037	0.0500	2.0	4.0	Report	0.01
Count	59	59	59	59	59	59	59	59	3	3	58	58	20	58

Date	Chromium	Copper	Lead	Nickel	Silver	Zinc	Tetrachloro-ethylene	Nitrite plus Nitrate Nitrogen	Chemical Oxygen Demand	Settleable Solids	pH	
	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Max. Amount lb/day	Daily Max. Conc. mg/L	Daily Max. Conc. mg/L	Daily Min. Conc. SU	Daily Max. Conc. SU
October-00		0.04	<.031		<.004			51	332	0.3	6.8	8.6
November-00		0.04	<.079		0.004			26	369	<.1	7.4	8.5
December-00	<0.0106	<.046	<.004	<0.00309	<.006	0.011	0.010	32	370	0.2	6.8	8.4
January-01		<.005	<.088		0.004			154	347	<.1	7.2	8.5
February-01		0.02	<.067		<.007			84	264	0.3	7.2	8.7
March-01	<0.00147	<.031	<.079	0.008	<.034	0.012	<0.004	161	276	<.1	7.3	8.5
April-01		0.06	0.08					267	296	0.3	7.5	8.5
May-01		<.08	<.076		<.007			144	318	0.1	7.6	8.5
June-01	<0.00147	0.03	<.041	0.002	0.002	0.013	<0.004	196	282	<.1	7.2	8.2
July-01		0.02	0.02		0.010			246	198	<.1	7.4	8.3
August-01		0.01	<.058		<.006			133	229	<.1	6.9	8.7
September-01	<0.00147	0.01	<.041	0.010	0.005	0.282	<0.004	162	294	<.1	6.6	8.1
October-01		0.01	<.046		<.002			106	302	<.1	6.7	8.4
November-01		0.02	<.021		<.002			157	293	<.1	6.5	8.5
December-01	<0.00147	0.01	0.04	0.004	<.002	0.010	<0.00025	70	288	<.1	6.9	8.2
January-02		0.01	<.033		<.002			93	266	<.1	6.6	8.2
February-02		0.01	<.017		<.002			99	314	<.1	6.5	8.4
March-02	<0.00147	0.03	<.021	<0.0012	0.004	<0.00334	<0.004	84	318	<.1	6.9	8.7
April-02		0.01	<.036		<.003			102	332	0.3	6.1	8.5
May-02		0.01	0.05		<.003			62	230	<.1	6.9	8.6
June-02	<0.00147	0.01	0.03	0.013		0.006	<0.004	84	246	<.1	7.0	8.4
July-02					0.015			86	238	<.2	7.5	8.6
August-02		<.007	<.047		<.01			97	272	<.2	7.6	8.9
September-02	<0.00147	0.01	<.043	<0.0036	<.003	0.010	<0.00033	109	236	<.1	6.2	8.6
October-02	0.000	0.02	0.0	0.010	0.000	0.000	0.000	135	331	0.0	6.1	8.7
November-02		0.01	0.0		0.000			158	230	0.0	7.1	8.7
December-02		0.05	0.0		0.005			131	284	0.0	7.0	8.7
January-03		0.00	0.0		0.004			295	332	0.0	6.3	8.4
February-03	0.000	0.01	0.02	0.008	0.000	0.009	0.000	155	317	0.0	7.0	8.8
March-03		0.02	0.0		0.002			209	320	0.0	6.2	8.8
April-03	0.000	0.02	0.04	0.005	0.000	0.005	0.000	72	316	0.0	6.7	8.9
May-03		0.00	0.0		0.000			92	230	0.0	6.3	8.8
June-03		0.05	0.05		0.005			64	266	0.0	6.5	8.7
July-03	0.000	0.00	0.0	0.004	0.000	0.006	0.000	89	286	0.0	6.1	8.8
August-03		0.05	0.066		0.000			620	253	0.3	6.3	8.8
September-03		0.01	0.0		0.000			220	334	0.0	6.5	8.8
October-03	0.000	0.01	0.0	0.009	0.000	0.008	0.000	284	370	0.0	6.5	8.9
November-03		0.10	0.041		0.017			121	262	0.0	6.6	8.8
December-03		0.00	0.0		0.000			56	329	0.0	6.8	8.6
January-04	0.003	0.00	0.016	0.025	0.000	0.019	0.000	80	355	0.0	6.6	8.5
February-04		0.00	0.0		0.000			119	338	0.0	7.3	8.7
March-04		0.01	0.0		0.0022			60	364	0.4	7.4	8.8
April-04	0.000	0.00	0.0	0.000	0.000	0.024	0.000	99	364	0.0	6.4	8.9
May-04		0.00	0.0		0.000			95	338	0.0	6.3	8.9
June-04		0.00	0.0		0.000			82	306	0.0	6.6	8.6
July-04	0.000	0.00	0.0	0.006	0.000	0.010	0.004	98	353	0.2	6.3	8.6
August-04		0.00	0.0		0.000			193	290	0.0	6.1	8.9
September-04		0.03	0.0		0.002			47	370	0.0	6.5	8.7
October-04	0.000	0.01	0.0	0.004	0.000	0.010	0.000	142	316	0.0	6.2	8.9
November-04		0.01	0.0		0.000			111	316	0.0	6.7	8.9
December-04		0.00	0.0		0.000			233	328	0.0	7.0	8.8
January-05	0.000	0.01	0.0	0.009	0.000	0.032	0.000	141	367	0.0	6.7	8.7
February-05		<0.002	<0.002		<0.002			222	322	<0.1	6.4	8.1
March-05		0.01	0.0		0.000			232	336	0.0	7.0	8.7
April-05		0.01	0.0		0.000			253	350	0.2	6.4	8.8
May-05	0.000	0.00	0.0	0.005	0.000	0.022	0.000	102	273	0.0	6.6	8.9
June-05		0.00	0.0		0.000			65	311	0.2	6.2	8.4
July-05		<0.0015	<0.0015		<0.0015			96	326	<0.1	6.7	8.8
August-05		0.01	0.0		0.003			82	333	0.0	6.1	8.6
Standard Dev.	0.001	0.02	0.02	0.006	0.004	0.064	0.003	92	43	0.1	0.4	0.2
Minimum	0.000	0.00	0.00	0.000	0.000	0.000	0.000	26	198	0.0	6.1	8.1
Maximum	0.003	0.10	0.08	0.025	0.017	0.282	0.010	620	370	0.4	7.6	8.9
Average	0.000	0.02	0.01	0.008	0.002	0.027	0.001	137	305	0.1	6.7	8.6
Permit Limit	Report	1.0	0.1	Report	0.050	Report	Report	558	370	0.5	6.0	9.0
Count	19	58	58	19	57	20	20	59	59	59	59	59

APPENDIX 4a

NEW PERMIT LIMITS AND MONITORING REQUIREMENTS

Water Quality Based Effluent Calculations

The following procedure is used to calculate the allowable instream concentrations for permit limitations. If monitoring for a particular pollutant indicates that the pollutant is not present (i.e., consistently below detection level), then the division may drop the monitoring requirements in the reissued permit.

1. The most recent background conditions of the receiving stream segment are compiled. This information includes:
 - * 7Q10 of receiving stream
 - * Calcium hardness (25 mg/l, default)
 - * Total suspended solids (10 mg/l, default)
 - * Background metals concentrations (½ water quality criteria)
 - * Other dischargers impacting this segment (none)
 - * Downstream water supplies, if applicable
2. The chronic water quality criteria is converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, lead, nickel and zinc. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions.
3. The acute water quality criteria is converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, lead, nickel, zinc, silver and mercury. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions for the following metals: cadmium, copper, lead, nickel, silver and mercury.
4. The chronic criteria for Chromium (T) is given in the total recoverable form and is not converted to a dissolved lab condition or to the total recoverable ambient condition.
5. A standard mass balance equation determines the total allowable concentration (permit limit) for each pollutant. This equation also includes a percent stream allocation of 6%.

The following formulas are used to evaluate water quality protection:

$$C_m = \frac{Q_s C_s + Q_w C_w}{Q_s + Q_w}$$

where:

C_m = resulting in-stream concentration after mixing
C_w = concentration of pollutant in wastewater
C_s = stream background concentration
Q_w = wastewater flow
Q_s = stream low flow

to protect water quality:

$$C_w \leq \frac{(S_A) [C_m (Q_s + Q_w) - Q_s C_s]}{Q_w}$$

where (S_A) is the percent "Stream Allocation".

Calculations for this permit have been done using a standardized worksheet, titled "Water Quality Based Effluent Calculations." Division policy dictates the following procedures in establishing these permit limits:

1. The critical low flow values are determined using USGS data:

Fish and Aquatic Life Protection

7Q10 - Low flow under natural conditions

1Q10 - Regulated low flow conditions

Other than Fish and Aquatic Life Protection

30Q2 - Low flow under natural conditions

2. Fish & Aquatic Life water quality criteria for certain Metals are developed through application of hardness dependent equations. These criteria are combined with dissolved fraction methodologies in order to formulate the final effluent concentrations.

3. For criteria that are hardness dependent, chronic and acute concentrations are based on a Hardness of 25 mg/l and Total Suspended Solids (TSS) of 10 mg/l unless STORET or Water Supply intake data substantiate a different value. Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/l and 400 mg/l respectively. The minimum limit on the TSS value used for water quality calculations is 10 mg/l.

4. Background concentrations are determined from the division database, results of sampling obtained from the permittee, and/or obtained from nearby stream sampling data. If this background data is not sufficient, one-half of the chronic "In-stream Allowable" water quality criteria for fish and aquatic life is used. If the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, then the measured background concentration is used in lieu of the chronic "In-stream Allowable" water quality criteria for the purpose of calculating the appropriate effluent limitation (C_w). Under these circumstances, and in the event the "stream allocation" is less than 100%, the calculated chronic effluent limitation for fish and aquatic life should be equal to the chronic "In-stream Allowable" water quality criteria. These guidelines should be strictly followed where the industrial source water is not the receiving stream. Where the industrial source water is the receiving stream, and the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, consideration may be given as to the degree to which the permittee should be required

to meet the requirements of the water quality criteria in view of the nature and characteristics of the receiving stream.

The spreadsheet has fourteen (14) data columns, all of which may not be applicable to any particular characteristic constituent of the discharge. A description of each column is as follows:

Column 1: The "Stream Background" concentrations of the effluent characteristics.

Column 2: The "Chronic" Fish and Aquatic Life Water Quality criteria. For Cadmium, Copper, Lead, Nickel, and Zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Continuous Concentration (CCC) is calculated using the equation:

$$CCC = (\exp \{ m_C [\ln (\text{stream hardness})] + b_C \}) (CCF)$$

CCF = Chronic Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 1200-4-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no chronic criteria exists for silver. Published criteria are used for non-metal parameters.

Column 3: The "Acute" Fish and Aquatic Life Water Quality criteria. For Cadmium, Copper, Lead, Nickel, Silver, and Zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Maximum Concentration (CMC) is calculated using the equation:

$$CMC = (\exp \{ m_A [\ln (\text{stream hardness})] + b_A \}) (ACF)$$

ACF = Acute Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 1200-4-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no acute criteria exists for Total Chromium. Published criteria are used for non-metal parameters.

Column 4: The "Fraction Dissolved" converts the value for dissolved metal at laboratory conditions (columns 2 & 3) to total recoverable metal at in-stream ambient conditions (columns 5 & 6). This factor is calculated using the linear partition coefficients found in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

$$\frac{C_{\text{diss}}}{C_{\text{total}}} = \frac{1}{1 + \{ [K_{\text{po}}] [\text{ss}^{(1+a)}] [10^{-6}] \}}$$

ss = in-stream suspended solids concentration [mg/l]

Linear partition coefficients for streams are used for unregulated (7Q10) receiving waters, and linear partition coefficients for lakes are used for regulated (1Q10) receiving waters. For those parameters not in the dissolved form in columns 2 & 3 (and all non-metal parameters), a Translator of 1 is used.

Column 5: The "Chronic" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 2 by the value in column 4.

Column 6: The "Acute" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 3 by the value in column 4.

Column 7: The "Chronic" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the chronic limit.

Column 8: The "Acute" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the acute limit.

Column 9: The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Organism Consumption (Recreation).

Column 10: The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Water and Organism Consumption. These criteria are only to be applied when the stream use classification for the receiving stream includes both "Recreation" and "Domestic Water Supply."

Column 11: The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Domestic Water Supply.

Column 12: The Calculated Effluent Concentration associated with Organism Consumption.

Column 13: The Calculated Effluent Concentration associated with Water and Organism Consumption.

Column 14: The Calculated Effluent Concentration associated with Domestic Water Supply.

The calculated chronic water quality effluent concentrations from Column 7 should be compared, individually, to the values calculated in Columns 12, 13, and 14 in order to determine the most stringent chronic permit limitations. The calculated acute water quality effluent concentrations from Column 8 should then be compared, individually, to values equal to two (2) times the values presented in Columns 12, 13, and 14 in order to determine the most stringent acute permit limitations. These water quality based limits should then be compared to any technology based (CFR or Tennessee "Rules") effluent limitations, and/or any previous permit limitations, for final determination of the permit limits.

Allowable Concentrations in Nolichucky River Downstream of All Dischargers

**WATER QUALITY BASED EFFLUENT CALCULATIONS
 OUTFALL 001**

FACILITY: Nuclear Fuel Services
 PERMIT #: TN0002038

Stream (7Q10)	Stream (30Q5)	Waste Flow	Ttl. Susp. Solids	Hardness (as CaCO3)	Stream Allocation
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
134.6	194.8	0.0000	10	25	100

EFFLUENT CHARACTERISTIC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	Stream Bckgmd.	Fish/Aqua. Life Water Quality Criteria			Effluent Fraction	Fish & Aquatic Life Water Quality Criteria (7Q10)				Human Health Water Quality Criteria (30Q5)					
	Conc.	Chronic	Acute	Dissolved	In-Stream Allowable		Calc. Effluent Concentration		In-Stream Criteria			Calc. Effluent Concentration			
	[ug/l]	[ug/l]	[ug/l]	[Fraction]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	Organisms	Water/Organisms	DWS	Organisms	Water/Organisms	DWS	
Cadmium *	0.047	0.094	0.522	0.252	0.371	2.068	--	--	NA	NA	5.0	--	--	--	
Copper *	3.200	2.739	3.640	0.348	7.881	10.472	--	--	NA	N/A	NA	--	--	--	
Lead *	1.000	0.541	13.882	0.184	2.942	75.487	--	--	NA	NA	5.0	--	--	--	
Nickel *	5.100	16.096	144.918	0.432	37.231	335.209	--	--	4600.0	610.0	100.0	--	--	--	
Silver *	0.074	NA	0.296	1.000	NA	0.296	--	--	NA	NA	NA	--	--	--	
Zinc *	6.700	36.498	36.202	0.288	126.733	125.705	--	--	NA	NA	NA	--	--	--	
Mercury (T) **	0.025	0.908	1.690	1.000	0.908	1.690	--	--	0.051	0.05	2.0	--	--	--	
Chromium (T) **	0.870	100.000	NA	1.000	100.000	NA	--	--	NA	NA	100.0	--	--	--	
Cyanide (T) **	2.500	5.200	22.000	1.000	5.200	22.000	--	--	220000.0	700.0	200.0	--	--	--	
Antimony	2.800						--	--	640.0	5.6	6.0	--	--	--	
Arsenic	0.500	150.0	340.0	1.000	150.000	340.000	--	--	10.0	10.0	10.0	--	--	--	
Beryllium	2.000						--	--			4.0	--	--	--	
Selenium	1.300	5.0	20.0	1.000	5.000	20.000	--	--			50.0	--	--	--	
Thallium	0.850						--	--	6.3	1.7	2.0	--	--	--	

* Denotes metals for which Fish & Aquatic Life Criteria are expressed as a function of total hardness. The Fish & Aquatic Life criteria for this metal are in the dissolved form at laboratory conditions. The in-stream allowable criteria and calculated effluent concentrations are in the total recoverable form.

** The criteria for these parameters are in the total form.

*** The division performs sampling in the Nolichucky River upstream of this facility. The stream background concentration utilizes this data.

NOTE: Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q5 flow.

Mass Allocation in Nolichucky River for Non-Degradable Pollutants

EFFLUENT CHARACTERISTIC	Nolichucky Water Quality Limitations			
	Maximum Instream Effluent Conc.		Maximum Instream Effluent Mass	
	Chronic	Acute	Chronic	Acute
	ug/l	ug/l	lb/day	lb/day
Cadmium *	0.371	2.068	0.416	2.321
Copper *	7.881	10.472	8.843	11.761
Lead *	2.942	5.000	3.301	5.611
Nickel *	37.231	100.000	41.779	112.215
Silver *	NA	0.296	NA	0.333
Zinc *	126.733	125.705	142.214	141.060
Mercury (T) **	0.050	0.050	0.066	0.066
Chromium (T) **	100.000	100.000	112.215	112.215
Cyanide (T) **	5.200	22.000	6.835	24.687
Antimony	5.600	5.600	6.284	6.284
Arsenic	10.000	10.000	11.221	11.221
Beryllium	4.000	4.000	4.489	4.489
Selenium	5.000	20.000	5.611	22.443
Thallium	1.700	1.700	1.908	1.908

Waste Load Allocation	
Upstream Background Mass Allocation	
10% Reserve Allocation	
South Indian Creek Water Quality Allowance	
Martin's Creek Water Quality Allowance	
Nuclear Fuel Services Effluent Mass Discharge	
Erwin STP Effluent Mass Discharge	
North Indian Creek Water Quality Allowance	

EFFLUENT CHARACTERISTIC	Upstream Background Mass Allocation		10% Reserve Allocation		South Indian Creek Water Quality Allowance		Martin Creek Water Quality Allowance		Nuclear Fuel Services		Erwin STP		North Indian Creek		Remaining Allocation		Total Mass for Nolichucky River	
	ug/l	lb/day	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute
Cadmium *	0.047	0.05	0.042	0.23	0.017	0.09	0.005	0.03	0.0002	0.001	0.008	0.008	0.013	0.07	0.284	1.837	0.416	2.321
Copper *	3.200	3.28	0.884	1.18	0.354	0.47	0.106	0.14	0.002	0.120	0.158	0.190	0.283	0.38	3.779	6.001	8.843	11.761
Lead *	1.000	1.02	0.330	0.56	0.132	0.22	0.040	0.07	0.001	0.012	0.017	0.021	0.106	0.18	1.651	3.522	3.301	5.611
Nickel *	5.100	5.22	4.178	11.22	1.671	4.49	0.501	1.35	0.002	0.003	0.038	0.043	1.337	3.59	28.83	86.30	41.779	112.215
Silver *	0.074	0.08	NA	0.03	NA	0.01	NA	0.00	0.001	0.006	0.017	0.024	NA	0.01	NA	0.166	#VALUE!	0.333
Zinc *	6.700	6.86	14.221	14.11	5.689	5.64	1.707	1.69	0.002	0.003	0.666	0.840	4.551	4.51	108.517	107.4	142.214	141.060
Mercury (T) **	0.025	0.03	0.006	0.01	0.002	0.002	0.001	0.00	0.00004	0.006	0.003	0.003	0.002	0.00	0.017	0.011	0.066	0.066
Chromium (T) **	0.870	0.89	11.221	11.22	4.489	4.49	1.347	1.35	0.001	0.002	0.032	0.074	3.591	3.59	90.644	90.600	112.215	112.215
Cyanide (T) **	2.500	2.56	0.584	2.47	0.233	0.99	0.070	0.30	0.011	0.016	0.079	0.079	0.187	0.79	2.110	17.489	5.835	24.687
Antimony	2.800	2.87	0.628	0.63	0.251	0.25	0.075	0.08	0.001	0.001	0.016	0.016	0.201	0.20	2.243	2.243	6.284	6.284
Arsenic	0.500	0.51	1.122	1.12	0.449	0.45	0.135	0.13	0.003	0.013	0.016	0.016	0.359	0.36	8.626	8.616	11.221	11.221
Beryllium	2.000	2.05	0.449	0.45	0.180	0.18	0.054	0.05	0.000	0.000	0.032	0.032	0.144	0.14	1.583	1.583	4.489	4.489
Selenium	1.300	1.33	0.561	2.24	0.224	0.90	0.067	0.27	0.000	0.000	0.021	0.030	0.180	0.72	3.226	16.952	5.611	22.443
Thallium	0.850	0.87	0.191	0.19	0.076	0.08	0.023	0.02	0.002	0.002	0.016	0.016	0.061	0.06	0.668	0.668	1.908	1.908

WATER QUALITY BASED EFFLUENT CALCULATIONS
OUTFALL 001

FACILITY: NUCLEAR FUEL SERVICES
PERMIT: TN0002038
DATE: 2/27/2006

Stream (7Q10)	Stream (30Q5)	Waste Flow	Ttl. Susp. Solids	Hardness (as CaCO3)	Stream Allocation
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
129.9	188.1	1.9144	10	25	90

PARAMETER	1	2	3	5		6		7		8		9			10			11			12			13			14			15
	Stream Bckgmd. Conc.	Detection Levels		Fish/Aqua. Life Water Quality Criteria		Calculated Effluent Concentration		Human Health Water Quality Criteria (3005)			Calculated Effluent Concentration			Organisms	Water/Org	DWS	Organisms	Water/Org	DWS	Organisms	Water/Org	DWS	Organisms	Water/Org	DWS	Organisms	Water/Org	DWS	Max. Daily Effluent	
		MDL	*EPA MDL	Chronic	Acute	Chronic	Acute	Organisms	Water/Org	DWS	Organisms	Water/Org	DWS																	Organisms
CHRYSENE	0.0	10.0	2.5									0.18	0.038				16.1	3.4												<0.2
DI-N-BUTYL PHTHALATE	0.0	10.0	2.5									4500.0	2000.0				401984.1	178659.6												<2
DI-N-OCTYL PHTHALATE	0.0	10.0	*																											<2.9
DIBENZO(A,H) ANTHRACENE	0.0	10.0	*																											<0.2
1,2-DICHLOROBENZENE	0.0	1.0	2.0									0.18	0.038				16.1	3.4												<2
1,3-DICHLOROBENZENE	0.0	10.0	2.0									17000.0	2700.0				1518606.5	241190.4												<2
1,4-DICHLOROBENZENE	0.0	5.0	2.0									960.0	320.0				85756.6	28585.5												<2
3,3-DICHLOROBENZIDINE	0.0	5.0	2.0									2600.0	400.0				232257.5	35731.9												<2
DIETHYL PHTHALATE	0.0	10.0	*									0.28	0.2				25.0	18.8												<1
DIMETHYL PHTHALATE	0.0	10.0	1.9									44000	17000.0				3930511.0	1518606.5												<2
2,4-DINITROTOLUENE	0.0	10.0	1.6									1100000	270000.0				98262774.8	24119044.7												<2
2,6-DINITROTOLUENE	0.0	10.0	1.0									34.0	1.1				3037.2	98.3												<2
1,2-DIPHENYLHYDRAZINE	0.0	10.0	*									2.0	0.4				178.7	32.2												<2
FLUORANTHENE	0.0	10.0	2.2									140.0	130.0				12506.2	11612.9												<0.2
FLUORENE	0.0	10.0	0.3									5300.0	1100.0				473447.9	98262.8												<0.2
HEXACHLOROBENZENE	0.0	10.0	1.9									0.0029	0.0028	1.0			0.259	0.3	89.3											<2
HEXACHLOROBUTADIENE	0.0	10.0	5.0									180.0	4.4				16079.4	393.1												<2
HEXACHLORO-CYCLO-PENTADIENE	0.0	10.0	*									17000.0	240.0	50.0			1518606.5	21439.2	4466.5											<2
HEXACHLOROETHANE	0.0	10.0	0.5									33.0	44.0				2947.9	1250.6												<2
INDENO(1,2,3-CD)PYRENE	0.0	10.0	*									0.18	0.038				16.1	3.4												<0.2
ISOPHORONE	0.0	10.0	*									9600	350.0				857566.0	31265.4												<2
NAPHTHALENE	0.0	10.0	*																											<0.3
NITROBENZENE	0.0	10.0	10.0									690.0	17.0				61637.6	1518.6												<2.9
N-NITROSODI-N-PROPYLAMINE	0.0	10.0	*									5.1	0.050				455.6	4.5												<2
N-NITROSODI-METHYLAMINE	0.0	10.0	*									30.0	0.0069				2679.9	0.6												<2
N-NITROSODI-PHENYLAMINE	0.0	10.0	*									60.0	33.0				5359.8	2947.9												<2.9
PHENANTHRENE	0.0	10.0	0.7																											<0.2
PYRENE	0.0	10.0	0.3									4000.0	830.0				357319.2	74143.7												<1
1,2,4-TRICHLOROBENZENE	0.0		*																											<2

- a. Columns 7-8, and 12-14 are the effluent concentrations allowable to prevent exceedance of water quality criteria.
- b. Potential to exceed criteria exists if the measured quantity in column 15 exceeds, or could exceed, the calculated allowable concentrations in columns 7-8, and 12-14.
- c. Additional testing is required if the detection level used in the scan is higher than the state RDL and/or the MDL of the approved EPA scan method and industry is known to have that pollutant.
- d. All background concentrations for these volatile organic, acid-extractable, and base-neutral compounds are assumed zero in the absence of supporting monitoring data.
- e. Other metals for which data were provided on the application are evaluated on the Metals & Toxics spreadsheet.
- f. Reasonable potential does not exist for the following reason(s):
 The required MDL has been used and resulted in non-detection (BDL) or the contributing industrial processes are NOT likely to contain them.

APPENDIX 4b

New Permit Limits

PERMIT LIMITS						
OUTFALL 001						
EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY		MSRMNT. FRQNCY.	SAMPLE TYPE
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)		
FLOW	Report (MGD) *		Report (MGD) *		1/batch	Estimate
pH	Range 6.0 - 9.0**				1/batch	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30	--	40	--	1/batch	Grab
SOLIDS, SETTLEABLE	--	--	0.5 ml/l	--	1/batch	Grab
CHLORINE, TOTAL RESIDUAL (TRC)****	--	--	2.0	--	1/batch	Grab**
COD	--	--	370	--	1/Month	Grab
NITROGEN, AMMONIA TOTAL	20	--	30	--	1/batch	Grab
NITRITE PLUS NITRATE NITROGEN	--	250	--	375	1/batch	Grab
FLUORIDE, Soluble	15	--	20	--	1/batch	Grab
ARSENIC, TOTAL	--	--	Report	--	1/quarter	Grab
CADMIUM, TOTAL	--	--	0.01	--	1/Month	Grab
CHROMIUM, TOTAL	--	--	Report	--	1/quarter	Grab
COPPER, TOTAL	--	--	1.0	--	1/Month	Grab
LEAD, TOTAL	--	--	0.1	--	1/Month	Grab
MERCURY, TOTAL***	0.00037	--	0.050	--	1/batch	Grab
NICKEL, TOTAL	--	--	Report	--	1/quarter	Grab
SILVER, TOTAL	--	--	0.05	--	1/Month	Grab
URANIUM, NATURAL, TOTAL	2.0	--	4.0	--	1/batch	Grab
TETRACHLOROETHYLENE	--	--	Report	--	1/quarter	Grab

* Flow shall be reported in Million Gallons per Batch.
 ** pH and TRC analyses shall be performed within fifteen (15) minutes of sample collection.
 *** The chronic mercury limit shall apply only if the discharge of batches containing mercury occur four (4) or more consecutive days/week during the monitoring period; otherwise, only the daily maximum limit for batches containing mercury shall apply. If any individual analytical test result for mercury is less than the minimum quantification level (0.0002 mg/L), then a value of zero (0) may be used for DMR calculations and reporting requirements.
 **** The total residual chlorine limit is only applicable when chlorine is used in the treatment process.