

**FACT SHEET AND STATEMENT OF BASIS
ENSIGN-BICKFORD COMPANY
UPDES PERMIT # UT0025283
RENEWAL PERMIT FOR MINOR INDUSTRIAL FACILITY**

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DESCRIPTION OF FACILITY: An explosives manufacturing plant has been operated at the present Ensign-Bickford Company (EBCo) site since prior to World War II. Around June of 1986 a large quantity of dilute nitric acid was released at this facility as the result of liner failure in a storage pond. Prior to 1988 the wastewater disposal practices at the EBCo site may have included disposal of industrial waste from explosives production into unlined ditches, pits, and ponds. Elevated concentrations of nitrates, and low concentrations of constituents of energetic materials (CEM's) have been detected in a municipal water supply well owned and operated by Mapleton City. This prompted Mapleton City to remove this well from service in November of 1994. EBCo, in cooperation with Mapleton City and the Utah Department of Environmental Quality (DEQ) has developed a plan to reactivate the well for use in either the municipal water system or in a municipal pressurized irrigation system. The following compounds have been detected in the Mapleton No. 1 well:

Nitrate	
RDX	Cyclotrimethylenetrinitramine
EGDN	Ethylene Glycol Dinitrate; Nitroglycol; Glycol Dinitrate
DEGDN	Diethylene Glycol Dinitrate; Dinitrodiglycol

In addition to the compounds identified above, the following compounds have been detected in ground water between the EBCo site and the Mapleton No. 1 well:

HMX	Cyclotetramethylenetetranitramine
PETN	Pentaerythritol Tetranitrate
TEGDN	Triethylene Glycol Dinitrate
TMETN	Metriol Trinitrate; 1,3-Propanediol; 2-Methylnitrate
BTTN	Butanetriol Trinitrate
TNT	Trinitrotoluene

DEQ has required that the Mapleton No. 1 well be pumped to serve as a hydraulic barrier to impede further northward migration of nitrate and other CEM's. To comply with this condition, the Mapleton No. 1 well

reactivation alternative has been designed to include surface water discharge that enables pumping of the well when municipal demand requirements do not warrant the well's use. The reactivation plan includes the utilization of a granular activated carbon (GAC) treatment system that will remove CEM's from the ground water prior to use in the culinary and/or pressurized irrigation systems. No reduction of nitrate concentration is contemplated for water discharged to surface water, nor will any be required to meet the permit effluent limitations contained in this permit.

The Hobble Creek portion of the Facility consists of flow from the Mapleton GAC facility and the Orton GAC facility with a discharge to either the Mapleton pressurized Irrigation System or directly to Hobble Creek. The flow from the Mapleton GAC makes up roughly 2/3's of the flow and the Orton GAC makes up roughly 1/3 of the flow to the system.

The Spanish Fork treatment facility is located at 3710 East Hwy. 6 in Spanish Fork. This discharge is mostly, if not completely, discharged to the City of Spanish Fork's pressurized irrigation system and only makes the Spanish Fork River when irrigation activities do not warrant its' use (approximately November through March). Effluent is piped via a conveyance pipeline (approximately 4.5 miles of 12-inch diameter PVC) from the treatment facility to a vault (located approximately 500 feet from the river), where it blends with other waters not associated with this groundwater recovery process before reaching the river.

DESCRIPTION OF DISCHARGES: Final discharge from Outfall 001 is directly to Hobble Creek where it passes under Main Street. This discharge point is located at latitude 40° 08' 52" and longitude 111° 34' 40" with STORET No. 499559. During the irrigation season, the facility discharges to the Mapleton City pressurized irrigation system with the flow being direct to a storage impoundment located east of the city. There is no public access to this storage impoundment. Outfall 001 is located at latitude 111° 34' 40" and longitude 40° 08' 52".

Discharge from Outfall 002 will be to the pressurized irrigation system or discharge to the Spanish Fork River depending on the season. Discharges to the Spanish Fork River will only be allowed when the background flow of the Spanish Fork River is 12 cfs or greater. If background falls below 12 cfs, discharge in the Spanish Fork River shall cease until such time the upstream flow in the Spanish Fork River equals or exceeds 12 cfs. Outfall 002 is located at a latitude of 111° 35' 21" and a longitude of 40° 05' 06".

STREAM CLASSIFICATION:

According to the Utah Water Quality Standards as contained in R317-2, the Hobble Creek is classified as indicated below:

- 2B protected for secondary contact recreation such as boating, wading, or similar uses.
- 3A protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
- 4 protected for agricultural uses including irrigation of crops and stock watering.

According to Utah Water Quality Standards contained in Utah Administrative Code (*UAC*) R317-2, the Spanish Fork River is classified as:

- 2B - protected for secondary contact recreation such as boating, wading, or similar uses.
- 3B - protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
- 3D - protected for water fowl, shore birds, and other water-oriented wildlife not included in classes 3A, 3B or 3C, including the necessary aquatic organisms in their food chain.
- 4 - protected for agricultural uses including irrigation of crops and stock watering.

BASIS FOR EFFLUENT LIMITATIONS: *Utah Administrative Code (UAC) R317-1-3* lists State secondary treatment standards for five-day biochemical oxygen demand (BOD5), total suspended solids (TSS), fecal coliforms, total coliforms, and pH. Based on data provided in the original permit application, and because the effluent is composed only of ground water, BOD5, TSS, and *E. coli* limitations are not necessary, thus will not be included in this permit. However, pH is applicable to this discharge permit and will be limited to between 6.5 and 9.0 at Outfall 001.

Total dissolved solids and ammonia nitrogen will not be included in this permit because there is no reasonable potential for these parameters to exceed water quality standards (effluent limitations that were derived from the wasteload allocation are much higher in concentration than that measured in the groundwater discharge/effluent).

Additional concerns addressed in this permit are the concentration and types of organic constituents in the effluent. As discussed above, a number of organic compounds are found to be present in the effluent. Most of these organic compounds are at very low concentrations, and the major confirmed component of all the organics is RDX. Therefore, if RDX concentrations are sufficiently controlled then other organic parameters should likewise remain below concentrations of concern. There is no State numeric water quality standard for RDX. However, there is a published EPA Lifetime Drinking Water Health Advisory (Office of Drinking Water, U.S. EPA, Washington D.C., November 1988) for RDX of 0.002 mg/L. The methodology for deriving the 0.002 mg/L health advisory for RDX has been challenged by EBCo, and will continue to be the subject of further evaluation by EBCo and the Department of Environmental Quality. Until an alternate resolution is determined, the lifetime health advisory will serve as the basis for establishing the effluent limits (e.g., the concentration of RDX, after mixing in the receiving stream, shall not exceed 0.002 mg/L).

Nitrate nitrogen is also a parameter of concern. It is included in the State drinking water standards at a concentration of 10 mg/l and is included in the State water quality standards as a pollution indicator (4 mg/L in order to protect against eutrophication). If it appears that the in-stream mix may exceed 4 mg/L, either that limit must be met, or an appropriate stream assessment must be completed to determine what in-stream mix is appropriate. An impact assessment was made by Dr. Lavere B. Merritt on the amount of nitrate nitrogen that can be discharged without impact in Hobbles Creek and Utah Lake. In summary, Dr. Merritt recommended that 10 mg/L nitrate nitrogen be considered the maximum total downstream concentration in Hobbles Creek. Dr. Merritt felt that the 10 mg/L downstream mix concentration would

alleviate any drinking water concerns and would have insignificant effects on the eutrophication of Hobble Creek or Utah Lake. The wasteload allocation for this facility supports this assessment and is discussed below.

The wasteload allocation indicates that there are six flow ranges needed to determine specific RDX and nitrate nitrogen effluent limit concentrations at Outfall 001 and Outfall 002. These flow ranges, and the corresponding effluent limit concentrations for RDX and nitrate nitrogen are shown in the tables below. EBCo will be required to meet the RDX and nitrate nitrogen concentrations of the flow range associated with the highest flow rate of the month. For example, if EBCo's discharges varied in any particular month, but reached no higher than 2.0 cfs at any time, then the flow range would be considered in the 1.68-2.23 cfs range in the table, and the corresponding effluent limitation would be 0.007 mg/L for RDX, and 32.5 mg/L for nitrate nitrogen. EBCo's maximum effluent flow rate is limited to 6.13 cfs by this permit. When calculating these effluent limits, the maximum flow rate for each flow range was used as the effluent flow in the mass balance equation. Additionally, an additional 20% margin of safety factor was included when determining the final effluent limitation. The results of these calculations can be found in Table 2.

There is no published standard analytical method in the literature (which has been certified by EPA) as an approved method for detection of such low concentrations of RDX and other CEM compounds. Therefore, it was up to the State and the permittee to develop an appropriate analytical method for RDX and other CEM compounds. EPA Method SW8330 has been modified to facilitate low concentration quantification of RDX and other CEM compounds. Future advances in analytical technology may warrant appropriate modifications to this method.

WHOLE EFFLUENT TOXICITY (WET) TESTING REQUIREMENTS: The primary basis for requiring a permit for this discharge is the presence of organic compounds, and the potential toxicity risk they present. However, it is acknowledged that the permittee is only discharging groundwater, not process wastewater, and there have been no WET testing failures during the previous permit coverage period. Therefore, acute and chronic testing shall be required yearly on an alternating basis. The permit will contain a reopener provision to include additional WET testing requirements and/or limits if warranted in the future.

STORM WATER REQUIREMENTS: EBCo will not need to apply for an industrial storm water permit at this time. However, if it is known that one acre or more of ground will be disturbed during future construction activities, a storm water construction permit will be required. The Company has expressed their preference for such coverage under the Utah General Permit as opposed to including applicable requirements in this permit. Any such permit must be obtained before construction activities begin.

PRETREATMENT REQUIREMENTS: It is not contemplated that discharges covered under this permit will be discharged directly to the sanitary sewer; however, water from back wash of GAC treatment units and/or carbon transfer slurry water could be discharged to the sanitary sewer. Any wastewater, discharged to a public sanitary sewer is subject to Federal, State, and local pretreatment regulations. Pursuant to Section 307 of the Clean Water Act, EBCo shall comply with all applicable Federal pretreatment regulations promulgated in *40 CFR Section 403*, the State pretreatment requirements found in *UAC R317-8-8*, and any specific local discharge limitations developed by the wastewater treatment plant accepting any process wastewater from EBCo.

TABLE 1: SUMMARY OF EFFLUENT LIMITATIONS:

Effluent Limitations:

Table 1: Effluent Limitations Outfall 001				
Parameter, Units	30-Day Average	7-Day Average	Daily Minimum	Daily Maximum
pH, S.U.	NA	NA	6.5	9.0
Nitrate-Nitrogen, mg/L	NA	NA	NA	a/
RDX, ug/L /b	NA	NA	NA	a/
Flow, cfs	NA	NA	NA	3.34
DO, mg/L	NA	NA	4.5, c/	NA
WET Testing	NA	NA	NA	Pass/Fail d/

a/ Nitrate nitrogen and RDX limitations are based upon effluent flow ranges as indicated in the tables below. The permittee is required to meet the RDX and nitrate-nitrogen concentrations of the flow range associated with the highest flow rate of the month. The permittee is not allowed to discharge more than 3.34 cfs at any time.

b/ Analyses of RDX shall be made by the method appended to the fact sheet and statement of basis in Appendix A, or by any other method approved in writing by the Director.

c/ DO limits are only applicable during non-irrigation season (November-March)

d/ Acute Pass LC₅₀, Chronic Pass for Outfall 001 IC₂₅ = 46.3% effluent, Outfall 2 IC₂₅ = 22% effluent.

Table 2: RDX And Nitrate-Nitrogen Limits Based for Outfall 001		
Effluent Flow Range (cfs)	Daily Maximum RDX Concentration (mg/L)	Daily Maximum Nitrate-Nitrogen Concentration (mg/L)*
0.00 - 0.56	0.0285	128.9
0.57 - 1.11	0.0152	69.1
1.12 - 1.67	0.0106	48.8
1.68 - 2.23	0.0070	32.5
2.34 - 2.79	0.0050	23.5
2.80 - 3.34	0.0041	19.3

Table 3: RDX And Nitrate-Nitrogen Limits Based for Outfall 002		
Effluent Flow Range (cfs)	Daily Maximum RDX Concentration (mg/L)	Daily Maximum Nitrate-Nitrogen Concentration (mg/L)*
0.00 - 0.56	0.0449	124.1
0.57 - 1.11	0.0236	67.6
1.12 - 1.67	0.0164	48.3
1.68 - 2.23	0.0128	38.7
2.34 - 2.79	0.0106	32.9
2.80 - 3.34	0.0092	29.1

*Assumes an upstream (background) nitrate-nitrogen concentration of 1 mg/L.

Table 4: Self-Monitoring and Reporting Requirements a/			
Parameter	Sampling Frequency	Sample Type	Units
pH	Monthly	Immediate	S.U.
Nitrate Nitrogen	Monthly	Grab	mg/L
RDX	Monthly	Grab	mg/L
Flow b/ c/	Continuous	Recorded	cfs
DO	Monthly	Immediate	mg/L
WET	Yearly /d	Grab	Pass/Fail

- a/ See Definitions, *Part VIII*, for definition of terms.
- b/ If the rate of discharge is controlled, the rate and duration of discharge shall be reported.
- c/ If the flow in the Spanish Fork River immediately upstream of the point where this discharge enters the river drops below 12 cfs (7.8 MGD) the permittee shall cease discharging until the upstream flow again exceeds 12 cfs
- d/ The facility shall alternate between the Chronic and Acute tests.

TMDL REQUIREMENTS: This facility ultimately discharges to Utah Lake which is listed on Utah's 303(d) list of impaired waterbodies as defined in the Clean Water Act. As required under federal regulations, a total maximum daily load (TMDL) will be developed for all 303(d) listed waters. Specifically, Utah Lake has been identified as impaired for total phosphorous (TP) and Total Dissolved

Solids (TDS). Currently, a TMDL evaluation is underway for the lake. The TMDL process may result in pollutant load reductions and wasteload allocations for either of these constituents. Wasteload allocations would then be translated to effluent limits in UPDES permits. It is therefore strongly recommended that the facilities' staff participate in the TMDL process. It is also recommended that the facility self-monitor TP and TDS on a monthly basis in order to better quantify their contribution of phosphorus and Total Dissolved Solids loading to the lake. The TMDL staff at the Division of Water Quality will be responsible for scheduling and notifying appropriate facilities personnel regarding TMDL meetings. In addition, please contact your UPDES permit writer for information on scheduled TMDL meetings.

SIGNIFICANT CHANGES:

This permit is combining two existing permits into one permit coverage. As a result, the Permit for Ensign Bickford Spanish Fork Facility is being eliminated (UPDES # UT0025275) There are no significant changes to the effluent limits for the facilities. WET testing has been changed from yearly to Biannually with alternating species.

PERMIT DURATION

It is recommended that this permit be effective for a duration of five (5) years.

Drafted by Lonnie Shull
Environmental Scientist
Utah Division of Water Quality

APPENDIX A:

DEVELOPMENT OF EFFLUENT LIMITATIONS FOR RDX

$C_{up} F_{up} + C_e F_e = C_{ds} F_{ds}$ Normal mass balance equation.

C_{up} = Concentration upstream

F_{up} = Upstream flow in cfs

C_e = Concentration in the effluent

F_e = Effluent flow

C_{ds} = Concentration downstream

F_{ds} = Downstream flow = $F_{up} + F_e$

$$C_e F_e = C_{ds} F_{ds} - C_{up} F_{up}$$

$$C_e = \frac{C_{ds} F_{ds} - C_{up} F_{up}}{F_e}$$

$$F_{ds} = F_{up} + F_e$$

$$C_e = \frac{C_{ds} (F_{up} + F_e) - (C_{up} F_{up})}{F_e}$$

Plug in the real values:

$$C_{ds} = 0.002 \text{ mg/L}$$

$F_{up} = 7.1$ cfs which will be considered as the 7Q10 for this constituent.

C_{up} = Background RDX concentration which must be taken as 0 mg/L.

F_e = Effluent flow 6.13 cfs

$$C_e = \frac{0.002 \text{ mg/L} * (9.0 \text{ cfs} + 6.13 \text{ cfs}) - (0 \text{ mg/L} * 7.1 \text{ cfs})}{6.13 \text{ cfs}}$$

$$C_e = 0.0043 \text{ mg/L}$$

The results of effluent limit calculations for RDX are summarized in tables presented previously in the Statement of Basis.

DEVELOPMENT OF EFFLUENT LIMITATIONS FOR NITRATE-NITROGEN

Using the same equation as for nitrate-nitrogen:

$$C_e = \frac{C_{ds} (F_{up} + F_e) - (C_{up} * F_{up})}{F_e}$$

Plug in the real values:

$C_{ds} = 10.0 \text{ mg/L}$.

$F_{up} = 7.1 \text{ cfs}$ which will be considered as the 7Q10 for this constituent.

$C_{up} = \text{Background nitrate-nitrogen concentration} = 1.0 \text{ mg/L}$.

$F_e = \text{Effluent flow } 6.13 \text{ cfs}$

$$C_e = \frac{10.0 \text{ mg/L} * (9.0 \text{ cfs} + 6.13 \text{ cfs}) - (1.0 \text{ mg/L} * 7.1 \text{ cfs})}{6.13 \text{ cfs}}$$

$C_e = 20.4 \text{ mg/L}$

The results of effluent limit calculations for nitrate-nitrogen are summarized in tables presented previously in the Statement of Basis.

Effluent Flow Range (cfs)	Daily Maximum RDX Concentration (mg/L)	Daily Maximum Nitrate-Nitrogen Concentration (mg/L)*
0.00 - 0.56	0.0285	128.9
0.57 - 1.11	0.0152	69.1
1.12 - 1.67	0.0106	48.8
1.68 - 2.23	0.0070	32.5
2.34 - 2.79	0.0050	23.5
2.80 - 3.34	0.0041	19.3

Table 3: RDX And Nitrate-Nitrogen Limits Based for Outfall 002		
Effluent Flow Range (cfs)	Daily Maximum RDX Concentration (mg/L)	Daily Maximum Nitrate- Nitrogen Concentration (mg/L)*
0.00 - 0.56	0.0449	124.1
0.57 - 1.11	0.0236	67.6
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1.68 - 2.23	0.0128	38.7
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