Fact Sheet

Public Comment Start Date: March 24, 2006
Public Comment Expiration Date: April 24, 2006

Technical Contact: Brian Nickel
206-553-6251
800-424-4372, ext. 6251 (within Alaska, Idaho, Oregon and Washington)
Nickel.Brian@epa.gov

Proposed Reissuance of a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA)

McCain Foods USA
Burley Factory

EPA Proposes To Reissue NPDES Permit

EPA proposes to reissue an NPDES permit to the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

401 Certification

EPA is requesting that the Idaho Department of Environmental Quality certify the NPDES permit for this facility, under section 401 of the Clean Water Act. Comments regarding the certification should be directed to:

Regional Administrator
Idaho Department of Environmental Quality
1363 Fillmore St.
Twin Falls, ID 83301

Public Comment
Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at "http://epa.gov/r10earth/waterpermits.htm."

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-6251 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permit is also available at:

EPA Idaho Operations Office
1435 North Orchard Street
Boise, Idaho 83706
(208) 378-5746

Idaho Department of Environmental Quality
Twin Falls Regional Office
1363 Fillmore Street
Twin Falls, ID 83301
(208) 736-2190

Burley Public Library
1300 Miller Avenue
Burley, ID 83318
(208) 878-7708

Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
AML	Average Monthly Limit
BMP	Best Management Practices
BOD_5	Biochemical oxygen demand, five-day
ºC	Degrees Celsius
CFR	Code of Federal Regulations
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
IDEQ	Idaho Department of Environmental Quality
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OWW	Office of Water and Watersheds
O&M	Operations and maintenance
QAP	Quality assurance plan

RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit

I. Applicant

This fact sheet provides information on the draft NPDES permit for the following entity:

McCain Foods USA
Burley Factory
NPDES Permit # ID-000061-2

Physical Address:
218 West Highway 30
Burley, ID 83318

Mailing Address:
P.O. Box 10
Burley, ID 83318

Contact:
Bill Fowler, Environmental Manager

II. Facility Information

McCain Foods USA (McCain) owns and operates a potato processing facility in Burley Idaho. The previous permit expired on May 1, 2005, but since McCain submitted a timely application for renewal, the previous permit has been administratively extended under 40 CFR 122.6 until the permit can be reissued.

There are two potato processing plants on the site, Plant 1 and Plant 2. Process effluent from both plants is combined and the grease is separated from the wastewater. After separation of the grease, the wastewater is screened to remove large solids, and it then flows to a covered anaerobic lagoon where organic matter is removed via anaerobic digestion. From the covered anaerobic lagoon, the wastewater flows to selector tanks and into one of two aerobic lagoons, which are operated in parallel and provide additional removal of organic material and nutrients. From the aerobic lagoons the effluent flows to a secondary clarifier and through a Parshall flume, and is finally discharged to the Snake River though Outfall 001. The other two active outfalls, 002 and 004, do not contain process water, only potable water well pit overflow.

III. Receiving Water

A. Low Flow Conditions

The *Technical Support Document for Water Quality-Based Toxics Control* (hereafter referred to as the TSD) (EPA, 1991) and the Idaho Water Quality Standards (WQS) recommend the flow conditions for use in calculating water quality-based effluent limits (WQBELs) using steady-state modeling. The TSD and the Idaho WQS state that WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria. However, because the chronic criterion for ammonia is a 30-day average concentration not to be exceeded more than once every three years, EPA has used the 30B3 for the chronic ammonia criterion instead of the 7Q10. The 30B3 is a biologically-based design flow intended to ensure an excursion frequency of once every three years for a 30-day average flow rate.

The flow of the Snake River near the point of discharge is highly variable with the season. Therefore, EPA has calculated the 1Q10, 7Q10 and 30B3 on a seasonal, as well as a year-round, basis. The period of record for these calculations was 1970-2004. The seasonal low flows are as follows:

Table 1: Seasonal Low Flows in the Snake River (at USGS Station #13081500)

Season	**1Q10 (CFS)**	**7Q10 (CFS)**	**30B3 (CFS)**
Full year	279	344	428
November through April	279	344	428
May	1020	1340	1820
June through September	4200	4750	7330
October	2340	2720	4940

B. Water Quality Standards

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. The federal regulation at 40 CFR 122.4(d) prohibits the issuance of an NPDES permit which does not ensure compliance with the water quality standards of all affected States. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as warm or cold water biota, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial uses of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

The Idaho WQS state, in Section 100, that all waters of the State of Idaho are protected for the uses of industrial and agricultural water supply (100.03.b. and c.), wildlife habitats (100.04) and aesthetics (100.05). The WQS state, in Sections 252.02, 252.03, and 253 that these uses are to be protected by narrative criteria which appear in Section 200. These narrative criteria state that all surface waters of the State shall be free from hazardous materials; toxic substances; deleterious materials; radioactive materials; floating, suspended or submerged matter; excess nutrients; oxygen-demanding materials; and sediment in concentrations which would impair beneficial uses. The WQS also state, in Section 252.02, that criteria from *Water Quality Criteria 1972*, also referred to as the "Blue Book" (EPA-R3-73-033) can be used to determine numeric criteria for the protection of the agricultural water supply use.

At the point of discharge, the Snake River (also known as Milner Lake) is also designated for the following beneficial uses:

- warm water aquatic life habitat
- primary contact recreation

The Idaho WQS define warm water aquatic life as “water quality appropriate for the protection and maintenance of a viable aquatic life community for warm water species,” and primary contact recreation as “water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to swimming, water skiing, or skin diving.” These uses are protected by numeric criteria for temperature, dissolved oxygen, E. coli bacteria, pH, ammonia, chlorine, and a number of toxic compounds.

C. Water Quality Limited Segment

A water quality limited segment (WQLS) is any waterbody, or definable portion of a waterbody, where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards. In accordance with section 303(d) of the Clean Water Act, States must identify state waters not achieving water quality standards in spite of application of technology-based controls in National Pollutant Discharge Elimination System (NPDES) permits for point sources. Such waterbodies are known as water quality limited segments (WQLSs), and the list of such waterbodies is called the “303(d) list.” Once a water body is identified as a WQLS, the States are required under the Clean Water Act to develop a total maximum daily load (TMDL). A TMDL is a determination of the mass or concentration of a pollutant (including a margin of safety) that may be discharged to a water body from point, nonpoint, and natural background sources without causing the water body to exceed the water quality criterion for that pollutant. The segment of the Snake River to which the McCain facility discharges (which is also known as Milner Lake) has been listed under Section 303(d) of the Clean Water Act as not attaining or not expected to meet the state water quality standards for dissolved oxygen, nutrients, and sediment. There were two TMDLs written which addressed water quality problems on this reach of the Snake River.

Middle Snake River Watershed Management Plan

In 1997, IDEQ prepared and EPA approved a TMDL for total phosphorus in the Middle Snake River entitled the *Middle Snake River Watershed Management Plan.* This TMDL included a wasteload allocation (WLA) of 496 lb/day of total phosphorus for the McCain Foods USA facility. The recently-expired permit included total phosphorus effluent limits consistent with this WLA.

Lake Walcott TMDL

In June 2000, EPA approved the Lake Walcott TMDL, which included a more stringent wasteload allocation for total phosphorus for this source than did the *Middle Snake River Watershed Management Plan*. The WLA for the McCain facility is 399 lb/day for total phosphorus. The draft permit contains an average monthly limit of 399 lb/day total phosphorus, consistent with this WLA. The maximum daily limit for total phosphorus was calculated based on the WLA and the effluent variability, using the procedures outlined in the TSD. See Appendix F for details on the derivation of the total phosphorus effluent limits in the draft permit.

IV. Effluent Limitations

A. Basis for Effluent Limitations

In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards of a waterbody are being met and may be more stringent than technology-based effluent limits. The bases for the proposed effluent limits in the draft permit are provided in Appendix C.

B. Proposed Effluent Limitations

Tables 2 and 3 (below) present the proposed average monthly, maximum daily, and instantaneous maximum effluent limits for outfalls 001, 002, and 004. A comparison to previous effluent limits is provided for Outfall 001. No such comparison is provided for Outfalls 002 and 004 because these outfalls were not subject to any effluent limits during the previous permit cycle.

The proper flow tier for effluent limits which are contingent upon river flow must be determined by the average river flow for the monitoring month, as recorded by the USGS gauge at Minidoka, Idaho. Only one flow tier can be effective for any calendar month.

The proper pH tier must be determined by the average river pH for the monitoring month, as measured downstream of the discharge as required by the permit. Only one pH tier can be effective for any calendar month.

The proposed permit also contains the following narrative limitations:

The permittee must not discharge, from any outfall, floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses of the receiving water.

E. Coli Effluent Limits

The E. coli effluent limits in the draft permit include both a geometric mean and an instantaneous maximum limit, pursuant to the E. coli water quality criteria for the protection of the beneficial use of primary contact recreation that were in effect as of the date the draft permit was made available for public comment (IDAPA 58.01.02.251.01.b. and c.). The State of Idaho is contemplating a change to these criteria, which would make the geometric mean the sole criterion for the protection of this use. The Standards would require additional samples to be taken if individual E. coli samples exceeded 406 organisms per 100 ml in waters protected for the use of primary contact recreation. If this change to the water quality standards is submitted to and approved by EPA before the final permit is issued, the final permit will not include the instantaneous maximum effluent limit for E. coli, but will retain the geometric mean limit and may require additional sampling to determine compliance with the geometric mean limit, should the effluent concentration of E. coli exceed 406 organisms per 100 ml.

Table 2: Effluent Limits for Outfall 001

Parameter	Units	Proposed Effluent Limits		Previous Effluent Limits	
		Average Monthly Limit	Maximum Daily Limit	Average Monthly Limit	Maximum Daily Limit
BOD_5 River flow[1] <500 CFS	lb/day	**1500**	**3000**	1500	3000
BOD_5 500 CFS ≤ River Flow[1] <1100 CFS	lb/day	**2050**	**4100**	2050	4100
BOD_5 River flow[1] ≥ 1100 CFS	lb/day	**4244**	**8488**	4100	8200
TSS	lb/day	**4244**	**8488**	4100	8200
pH	s.u	**6.0 to 9.0 at all times**		6.0 to 9.0 at all times	
Total Phosphorus as P	lb/day	**399**	**772**	500	820
Total Ammonia as N Oct. 1 – Oct. 31	lb/day	**1600**	**2700**	1600[4]	2700[4]
Total Ammonia as N Nov. 1 – April 30 River flow[1] ≥ 1100 CFS	mg/L	**12.5**	**43.5**	---	---
	lb/day	**497**	**1732**	2380[5]	2760[5]
Total Ammonia as N Nov. 1 – April 30 River flow[1] < 1100 CFS and pH ≤ 8.50	mg/L	**6.16**	**21.4**	---	---
	lb/day	**245**	**853**	850 to 900[5]	1500 to 1800[5]
Total Ammonia as N Nov. 1 – April 30 River flow[1] < 1100 CFS and pH > 8.50	mg/L	**3.44**	**12.0**	---	---
	lb/day	**137**	**476**	560 to 900[5]	1500 to 1800[5]
Temperature	ºC	**---**	**32**	---	32
Total Residual Chlorine[2,6]	µg/L	**99.0**	**199**	---	---
	lb/day	**3.94**	**7.90**	---	---
E. Coil	#/100	**126[7]**	**406[3]**	---	---

Notes:
1. For purposes of the flow-tiered BOD_5 and ammonia effluent limits, "river flow" for any date means the arithmetic mean of the flows recorded by the USGS gauge at Minidoka, Idaho (Station #13081500) during the monitoring month. The permittee must record and report the average and minimum river flows.
2. Effluent limits for total residual chlorine for outfall 001 apply only if the permittee adds chlorine to the effluent for total or partial disinfection.
3. No single sample may exceed 406 organisms per 100 ml (instantaneous maximum limit).
4. The previous permit had two flow tiers for ammonia limits in effect from October through November (1100 CFS or greater and less than 1100 CFS). EPA has determined that flows less than 1100 CFS occur very infrequently during the month of October, therefore this seasonal flow tier and associated ammonia limits are not included in the proposed permit. See "Basis for Less Stringent Effluent Limits, below."
5. These limits were effective from December 1 through April 30 under the previous permit. In some cases, the previous effluent limits are reported as ranges because the previous permit used different flow and pH tiers than the proposed permit.
6. The average monthly limit for total residual chlorine in effect for outfall 001 is not quantifiable using EPA-approved analytical methods. EPA will use the minimum level (ML) of 100 µg/L as the compliance evaluation level for this parameter. The permittee will be considered compliant with the average monthly chlorine limitation if the monthly average chlorine concentration is less than 100 µg/L and the monthly average mass discharge of chlorine is less than 3.98 lb/day.
7. The monthly geometric mean E. coli concentration must not exceed 126 organisms/100 ml.

Table 3: Effluent Limits for Outfalls 002 and 004			
Parameter	**Units**	**Average Monthly Limit**	**Maximum Daily Limit**
Total Residual Chlorine (Outfall 002)	µg/L	130	393
	lb/day	3.85	11.6
Total Residual Chlorine (Outfall 004)	µg/L	148	419
	lb/day	4.10	11.6
Notes: Effluent limits for total residual chlorine for Outfalls 002 and 004 are effective at all times.			

C. Basis for Less Stringent Effluent Limits

For outfall 001, the draft permit proposes less stringent TSS limits under all receiving water flow conditions and less stringent BOD_5 limits during high receiving water flows than did the previous permit. The draft permit also proposes eliminating the lower flow tier for ammonia limits during the month of October, retaining only the high flow tier limits (river flows greater than or equal to 1100 CFS), with those limits becoming effective for all receiving water conditions during the month of October.

Statutory Prohibitions on Backsliding

Section 402(o) of the Clean Water Act (CWA) prohibits "backsliding" in NPDES permits but provides limited exceptions to this prohibition. Section 402(o)(1) of the CWA states that a permit may not be reissued with less-stringent limits established based on Sections 301(b)(1)(C), 303(d) or 303(e) (i.e. water quality-based limits or limits established in accordance with State treatment standards) except in compliance with Section 303(d)(4). Section 402(o)(1) also prohibits backsliding on technology-based effluent limits established using best professional judgment (i.e. based on Section 402(a)(1)(B)), but in this case, none of the effluent limits being relaxed are based on best professional judgment. Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's antidegradation policy.

Additionally, Section 402(o)(2) contains exceptions to the general prohibition on backsliding in 402(o)(1). According to the *U.S. EPA NPDES Permit Writers' Manual* (EPA-833-B-96-003) the 402(o)(2) exceptions are applicable to WQBELs (except for 402(o)(2)(B)(ii) and 402(o)(2)(D)) and are independent of the requirements of 303(d)(4). Therefore, WQBELs may be relaxed as long as either the 402(o)(2) exceptions or the requirements of 303(d)(4) are satisfied. At a minimum, the 402(o) exceptions are met for all backsliding proposed in the draft permit.

Even if the requirements of Sections 303(d)(4) or 402(o)(2) are satisfied, Section 402(o)(3) prohibits backsliding which would result in violations of water quality standards or effluent limit guidelines.

Basis for backsliding on BOD and TSS

The effluent limits for TSS and for BOD_5 during periods of high river flow are technology-based effluent limits. These limits implement the effluent limit guidelines of 40 CFR Part 407, Subpart D, for the frozen potato products subcategory, and are based on the amount of raw material (potatoes) processed by the facility.

Since this permit was last reissued, the permittee has provided new information regarding the level of production at the facility. Production has increased slightly since the permit was reissued. Therefore, pursuant to Section 402(o)(2)(B)(i) of the CWA, EPA is revising the effluent limits for TSS and for BOD during high flows.

BOD_5 effluent limits in effect during periods of low river flow are water quality-based effluent limits, not technology-based effluent limits. These limits as stringent as those in the previous permit and are not subject to prohibitions on backsliding.

Basis for backsliding on Ammonia

Based on new information regarding receiving water flows, EPA has determined that river flows less than 1100 CFS occur very rarely during the month of October. The 1Q10 flow during October is 2340 CFS. Using flow records from 1960 through 2004, DFLOW predicts that the 1Q24 flow rate is 1110 CFS, and that the 1Q25 flow rate is 1090 CFS. Therefore, daily average flows less than or equal to 1100 CFS will only occur approximately once every 24 to 25 years. The flow-tiered effluent limits in the expired and proposed permits are based on monthly average river flows. A monthly average river flow of less than 1100 CFS for October will occur even less frequently. Because river flows less than 1100 CFS are very improbable during the month of October, EPA has eliminated the ammonia limits for the low-flow tier (less than 1100 CFS) pursuant to Section 402(o)(2)(B)(i) of the CWA.

EPA has retained only the high-flow tier limits from the previous permit (those in effect for river flows greater than or equal to 1100 CFS). EPA has determined that a discharge of ammonia in compliance with these limits will not cause or contribute to water quality standards violations for ammonia under critical conditions during the month of October.

EPA has changed the flow and pH tiers for the ammonia limits in effect from November through April, but under no circumstances are the proposed limits less stringent than those in the previous permit. Therefore, the ammonia limits in effect from November through April are not subject to the anti-backsliding provisions of the Act.

Clean Water Act Section 303(d)(4) and 402(o)(3) Requirements

Regarding the 303(d)(4) and 402(o)(3) requirements, the less-stringent TSS and high-flow BOD_5 effluent limits are consistent with the effluent limit guidelines for this industry. The Lake Walcott TMDL notes that there is unallocated loading for sediment in the watershed in the amount of 63 tons per day (Table 47a). The proposed increase in the TSS limits for the McCain facility is 144 lb/day (0.072 tons/day), which is only 0.11% of the unallocated loading capacity for sediment. Also, the wastewater treatment plant for the nearby former J.R. Simplot frozen potato products manufacturing facility has been acquired by the City of Burley and converted to a POTW. Due to this change in status, it is now subject to more-stringent technology-based effluent limits for BOD_5 and TSS than it was previously. Therefore, once the new permits for the McCain and City of Burley discharges become effective, the total permitted loading of TSS and BOD_5 from the two sources will actually decrease. Therefore, EPA believes that the less-stringent TSS limits are consistent with sections 303(d)(4) and 402(o)(3) of the CWA.

Dissolved oxygen levels in recent years have consistently been above the criterion of 5.0 mg/L. EPA does not expect that a modest increase in permitted BOD loading from the McCain facility will result in water quality standards violations for dissolved oxygen, especially since this modest increase will be more than offset by the reduction in permitted BOD_5 loading from the former Simplot facility (now owned and operated by the City of Burley). The revised BOD limits are consistent with the EPA-promulgated effluent limit guidelines for this industry. Therefore, EPA believes that the less-stringent BOD limits for high-flow periods are consistent with sections 303(d)(4) and 402(o)(3) of the CWA.

EPA has determined that the high flow tier ammonia limits are stringent enough to protect water quality standards under critical conditions during the month of October. Therefore, EPA believes that the elimination of ammonia limits for river flows less than 1100 CFS during the month of October is consistent with sections 303(d)(4) and 402(o)(3) of the CWA.

D. Schedules of Compliance for Total Residual Chlorine and E. coli

The WQS state (in Section 400.03) that discharge permits for point sources may incorporate schedules of compliance, which allow a discharger to phase in, over time, compliance with water quality-based effluent limitations when new limitations are in the permit for the first time. The proposed permit contains compliance schedules, which require that McCain comply with the final E. coli effluent limitations for outfall 001 within two years of the effective date of the final permit and comply with the final total residual chlorine effluent limitations for outfalls 002 and 004 within four and one half years of the effective date of the final permit. If IDEQ does not grant these compliance schedules to the McCain facility in its final Clean Water Act section 401 certification of this permit, or if the compliance schedule includes different or additional conditions than those proposed in the draft permit, EPA will make the necessary changes to the permit to ensure that it is consistent with the final certification.

Although the proposed ammonia limits in effect from November through April are more stringent than those in the previous permit, effluent data submitted by the permittee indicates that the facility will not have difficulty complying with the more stringent effluent limits in the draft permit. The 95^{th} percentile concentration of ammonia reported by the facility between January 2000 and April 2005 was 0.496 mg/L and the 95^{th} percentile mass discharge of ammonia was 13.3 lb/day. These values are much lower than the proposed effluent limits for ammonia. Therefore, the draft permit does not propose a compliance schedule for the more stringent ammonia limits.

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are necessary and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) to the U.S. Environmental Protection Agency (EPA).

B. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using EPA approved test methods (generally found in 40 CFR 136) and if the Method Detection Limits are less than the effluent limits.

Tables 4 and 5, below, describe the effluent monitoring requirements for the McCain Foods USA facility in the draft permit. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" must be reported on the DMR.

Effluent monitoring frequencies for certain pollutants and seasons were reduced, either because previous effluent data had shown that the discharge did not have the reasonable potential to cause or contribute to water quality standards violations for those pollutants, or because of a good overall performance history. Any reductions in monitoring frequency are consistent with EPA's *Interim Guidance for Performance-Based Reduction of NPDES Permit Monitoring frequencies* (1996). The effluent monitoring frequency for total phosphorus was increased to twice per week from weekly, in order to better determine compliance with the new, more stringent effluent limits.

Table 4: Effluent Monitoring Requirements for Outfall 001

Parameter	Units	Sample Frequency	Sample Type
Flow	mgd	continuous	recording
Stream Flow	CFS	daily	See Note 3
BOD_5	mg/L	1/week	24-hour composite
	lbs/day		calculation[1]
TSS	mg/L	1/week	24-hour composite
	lbs/day		calculation[1]
pH	s.u.	5/week	grab
Total Phosphorus as P	mg/L	2/week	24-hour composite
	lb/day		
Total Ammonia as N (May 1 – October 31)	mg/L	1/month	24-hour composite
	lb/day		

Table 4: Effluent Monitoring Requirements for Outfall 001

Parameter	Units	Sample Frequency	Sample Type
Total Ammonia as N (November 1 – April 30)	mg/L lb/day	1/week	24-hour composite
Total Residual Chlorine[1]	mg/L	1/week	grab
Oil and Grease	Visual	1/month	Visual
Oil and Grease	mg/L	1/quarter	grab
Floating, Suspended or Submerged Matter	Visual	1/month	Visual
Temperature	°C	Daily	grab
Alkalinity	mg/L as $CaCO_3$	1/quarter[2]	24-hour composite
Dissolved Oxygen	mg/L	1/quarter[2]	grab
E. Coli Bacteria	#/100 ml	5/month	grab
Nitrate + Nitrite as N	mg/L	1/quarter[2]	24-hour composite
Total Kjeldahl Nitrogen	mg/L	1/quarter[2]	24-hour composite
Total Dissolved Solids	mg/L	1/quarter[2]	24-hour composite
Whole Effluent Toxicity	TU_c	Once	24-hour composite

Notes:
1. These monitoring requirements apply only when the permittee adds chlorine to the wastewater for total or partial disinfection.
2. Quarters are defined as January through March, April through June, July through September and October through December.
3. The permittee must report the daily minimum and monthly average stream flow rates as recorded by the USGS Minidoka gauge (#13081500)

Table 5: Effluent Monitoring Requirements for Outfalls 002 and 004

Parameter	Units	Sample Frequency	Sample Type
Flow	mgd	1/week	measure
Total Residual Chlorine	mg/L lb/day	1/week	grab
pH	s.u	1/week	grab
Temperature	ºC	1/month	grab
BOD_5	mg/L	1/month	grab
TSS	mg/L	1/month	grab
Alkalinity	mg/L as $CaCO_3$	1/quarter	grab

C. Surface Water Monitoring

Table 6 presents the proposed surface water monitoring requirements for the draft permit. Surface water monitoring results must be submitted with the next permit application.

In addition to the requirements of Table 6, the permittee is required to monitor the flow rate of the receiving water, as measured by the USGS Minidoka gauge (station #13081500). The flow rates recorded by this gauge will be used to determine the receiving water flow rate for the purpose determining which of the flow-tiered effluent limits (for ammonia and BOD_5) are applicable during a calendar month. The flow tier will be determined by the monthly average receiving water flow rate for the monitoring month.

Table 6: Surface Water Monitoring Requirements	
Upstream Monitoring	
Parameter (units)	**Sample Frequency**
Flow	Daily at USGS Gauge
Temperature (ºC)	4/year[1]
pH (s.u.)	4/year[1]
Total Ammonia as N (mg/L)	4/year[1]
Alkalinity (mg/L)	2/year[2]
Downstream Monitoring	
Parameter (units)	**Sample Frequency**
Temperature (ºC)	2/year[2]
pH (s.u.)	See Note 3
Total Ammonia as N (mg/L)	2/year[2]

Notes:
1. At a minimum, sampling must occur once during the season of November 1st through April 30th once once during the month of May, once during the season of June 1 through September 30th, and once during the month of October.
2. At a minimum, sampling must occur once during the season of November 1st through April 30th and once during the season of May 1st through October 31st.
3. As required under the effluent limits and monitoring requirements for Outfall 001.

VI. Other Permit Conditions

A. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. McCain Foods is required to develop and implement a Quality Assurance Plan within 90 days of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

B. Best Management Practices Plan

The permit requires McCain to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. McCain is required to update its best management practices (BMP) plan for their facility within 90 days of the effective date of the final permit. The plan shall be retained on site and made available to EPA and IDEQ upon request.

C. Additional Permit Provisions

Sections III, IV, and V of the draft permit contain standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permitting action. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

VII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species.

In letters dated May 24, 2005 and June 9, 2005, respectively, EPA contacted NOAA Fisheries and USFWS to inform the services of its intent to reissue NPDES permits to the City of Burley IWTP and McCain Foods, and to request lists of endangered or threatened species which occur in the vicinity of the discharges.

In a telephone conversation on November 9, 2005, Ed Murrell of the Idaho State Habitat Office of NOAA Fisheries stated that there are no endangered or threatened species under NOAA Fisheries' jurisdiction in the Snake River upstream of the Hells Canyon Dam, which is approximately 400 river miles downstream of these discharges. Therefore, EPA has determined that the discharges will have no effect on any such species.

In a letter from Jeffery L. Foss of USFWS to Brian Nickel of EPA, dated July 6, 2005, USFWS replied with a species list stating that the bald eagle, Utah valvata snail, and Snake River physa snail may occur in the vicinity of the discharges. However, in an e-mail message dated November 19, 2005, Alison Beck-Haas stated that Utah valvata snail occurs only upstream of the discharges. Ms. Beck-Haas stated that the Snake River Physa snail may occur upstream, as well as below the Lower Salmon Falls Dam (which is located at River Mile 573, approximately 75 river miles downstream of the discharges). USFWS and EPA believe that the discharges are well outside the range of the Utah valvata snail and Snake River physa snail. Therefore the discharges will have no effect on these species.

Ms. Beck-Haas also stated that the first known occurrence of listed snails downstream from the discharges is the Bliss Rapids snail at River Mile 614, about 35 river miles downstream of the discharges. EPA believes that this location is outside the extent of the effects of the permitted discharges. McCain Foods USA and the City of Burley (and previously, J.R. Simplot) have performed water quality monitoring at several locations, including one half-mile above the Milner Dam, which is located 25 miles upstream of the first known occurrence of the Bliss Rapids Snail. The only violations of the Idaho water quality standards that have been observed at that location between November 2002 and August 2004 were for pH. The measured pH was above the maximum pH criterion in the Idaho water quality standards (9.0 standard units). However, the pH effluent limits (a range of 6.0 to 9.0 standard units) prevent the discharge from causing or contributing to this exceedance. Therefore, EPA has determined that the discharges will have no effect on the Bliss Rapids snail.

The bald eagle does occur in the vicinity of the discharges. However, USFWS has stated that the pathways for effects on bald eagles in this area are loss of perching or nesting habitat and loss of food resources (i.e. the availability and abundance of fish). EPA has established effluent limits and other conditions in the permit for the McCain facility, which are derived from and comply with Idaho's approved water quality standards. EPA and the State of Idaho have determined that these water quality standards are protective of the aquatic life uses of the receiving water. Therefore, the discharge, as authorized in the draft permit, will not result in a loss of food resources for bald eagles. The McCain facility is an existing facility, the continued operation of which will not result in a loss of perching or nesting habitat. Therefore, EPA has determined that the McCain discharge will have no effect on the bald eagle.

EPA will provide copies of the draft permit and Fact Sheet to USFWS and NOAA Fisheries at the beginning of the public comment period. EPA will consider any comments made by USFWS and NOAA Fisheries on the draft permit prior to issuance of a final permit.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, and grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. EPA has determined that the discharge from the McCain Foods facility will not affect any EFH species in the vicinity of the discharge, therefore EFH consultation is not required for this action.

C. State/Tribal Certification

Section 401 of the CWA requires EPA to seek State or Tribal certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards.

D. Permit Expiration

The permit will expire five years from the effective date.

VIII. References

EPA. 1973. *Water Quality Criteria 1972*. United States Environmental Protection Agency. EPA-R3-73-033.

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

IDAPA 58. 2004. *Water Quality Standards and Wastewater Treatment Requirements.* Idaho Department of Environmental Quality rules., Title 01, Chapter 02.

IDEQ. 1999. *Lake Walcott Subbasin Assessment and Total Maximum Daily Load, The*. Idaho Division of Environmental Quality.

Appendix A: Facility Information

General Information

NPDES ID Number:	ID-000061-2
Physical Address:	218 West Highway 30 Burley, ID 83318
Mailing Address:	P.O. Box 10 Burley, ID 83318

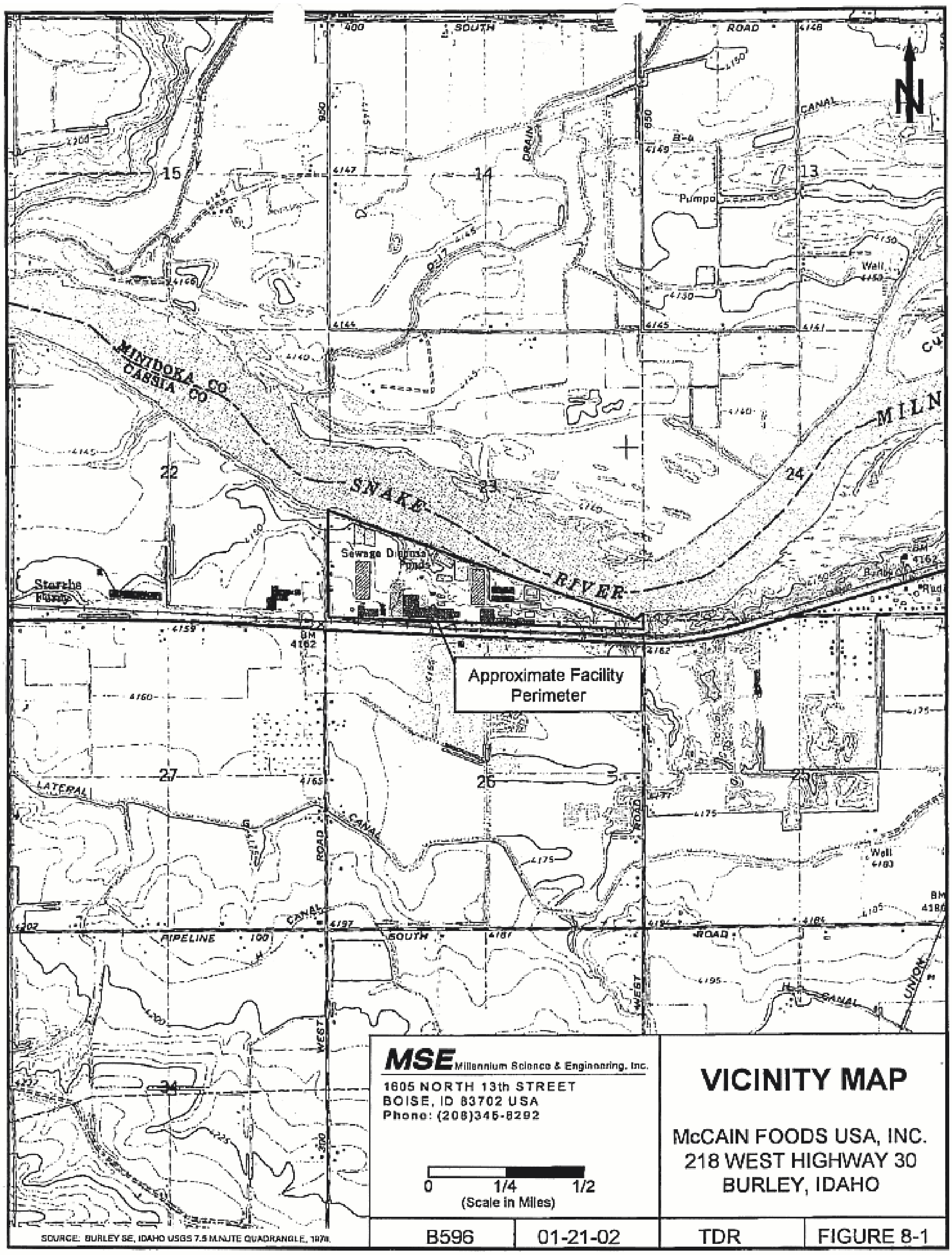
Facility Information

Type of Facility:	Frozen potato products manufacturer
Treatment Train (Outfall 001)	Grease separation, screening, anaerobic digestion, aerobic lagoon, secondary clarification
Flow:	Outfall 001: 4.77 mgd maximum, 2.71 mgd average Outfall 002: 3.943 mgd maximum, 1.128 mgd average Outfall 004: 5.397 mgd maximum, 0.902 mgd average
Outfall Location:	Outfall 001: latitude 42° 32' 15" N; longitude 113° 50' 50" W Outfall 002: latitude 42° 32' 15" N; longitude 113° 50' 50" W Outfall 004: latitude 42° 32' 10" N; longitude 113° 50' 25" W

Receiving Water Information

Receiving Water:	Snake River (Milner Pool)
Watershed:	Lake Walcott (HUC 17040209)
Beneficial Uses:	Warm water aquatic life Primary contact recreation Water supply for: • Agricultural • Industrial Primary contact recreation Wildlife Habitats Aesthetics

Appendix B: Facility Map



Appendix C: Basis for Effluent Limits

The following discussion explains in more detail the statutory and regulatory basis for the technology and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits in general, and Part C discusses facility-specific water quality-based effluent limits.

A. Technology-Based Effluent Limits

Effluent Limit Guidelines

EPA has promulgated effluent limit guidelines (ELGs) for process wastewater discharges from this industry in 40 CFR Part 407. The McCain Foods USA Burley factory is an existing frozen potato products facility, therefore the effluent limit guidelines in 40 CFR 407.47, representing the level of effluent quality attainable through application of the best conventional pollutant control technology, are the applicable effluent limit guidelines.

These effluent limit guidelines are based on the level of production at the facility. The federal regulation at 40 CFR 122.45(b)(2) requires that effluent limitations based on production or another measure of operation must be based on "a reasonable measure of actual production of the facility." McCain has indicated that its average production level is 3,031,580 pounds of raw material per day. EPA has calculated technology-based effluent limits based on this production figure and the effluent limit guidelines.

Table C-1: Technology-Based Effluent Limits
(40 CFR 407.47, Frozen Potato Products Subcategory)

Parameter	Average Monthly Limit (lb/1000 lb of raw material)	Maximum Daily Limit (lb/1000 lb of raw material)	Range
BOD_5	1.40	2.80	---
TSS	1.40	2.80	---
pH	---	---	6.0 - 9.0 s.u.
Limits Based On Expected Production Levels			
BOD_5 (lb/day)	4244	8488	---
TSS (lb/day)	4244	8488	---

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. Federal regulations at 40 CFR 122.4(d) prohibit the issuance of an NPDES permit that does not ensure compliance with the water quality standards of all affected States. The NPDES regulation (40 CFR 122.44(d)(1)) implementing Section 301(b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, or which have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality.

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation.

Reasonable Potential Analysis

When evaluating the effluent to determine if water quality-based effluent limits are needed based on numeric criteria, EPA projects the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern. EPA uses the concentration of the pollutant in the effluent and receiving water and, if appropriate, the dilution available from the receiving water, to project the receiving water concentration. If the projected concentration of the pollutant in the receiving water exceeds the numeric criterion for that specific chemical, then the discharge has the reasonable potential to cause or contribute to an exceedance of the applicable water quality standard, and a water quality-based effluent limit is required.

Sometimes it is appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body, and decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and the receiving water meets the criteria necessary to protect the designated uses of the water body. Mixing zones must be authorized by the Idaho Department of Environmental Quality. The water quality-based effluent limits in this permit for total residual chlorine and ammonia have been calculated using a mixing zone. If IDEQ does not grant a mixing zone for these pollutants, the water quality-based effluent limits for these pollutants will be recalculated such that the criteria are met before the effluent is discharged to the receiving water. If IDEQ grants a mixing zone which provides different dilution factors than those calculated by EPA, the water quality based effluent limits will be recalculated based on the revised dilution factors.

Procedure for Deriving Water Quality-based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of water quality standards in the receiving water.

In cases where a mixing zone is not authorized, either because the receiving water already exceeds the criterion, the receiving water flow is too low to provide dilution, or the State does not authorize a mixing zone, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that a discharge in compliance with the effluent limits will not cause or contribute to an exceedance of the criterion. Once a WLA is developed, EPA calculates effluent limits which are protective of the WLA using statistical procedures described in Appendix E.

The following discussion details the specific water quality-based effluent limits in the draft permit.

C. Facility-Specific Water Quality-Based Effluent Limits

Ammonia – Outfall 001

The Idaho water quality standards contain criteria for the protection of aquatic life from the toxic effects of ammonia. EPA has applied ammonia criteria to the receiving water which are protective of salmonids, including early life stages. The criteria are dependent on pH and temperature, because the fraction of the total ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the total ammonia criteria become more stringent as pH and temperature increase.

The previous permit contained effluent limits for ammonia which were contingent upon receiving water pH. These limits had two tiers: one for receiving water pH less than 8.35 standard units, and one for receiving water pH greater than 8.35 standard units. EPA has determined that the receiving water generally does not have a pH less than or equal to 8.35 standard units. Therefore, EPA has calculated the median pH observed in the receiving water upstream of the discharge, which is 8.5 standard units. This pH value will be the "trigger" for ammonia effluent limits which are tiered based on pH.

The following table details the equations used to determine water quality criteria for ammonia. The table also shows the values of these equations at the 95th percentile receiving water pH (for the entire year), which is 8.8 standard units, and at the median receiving water pH of 8.5 standard units. These two pH values were paired with the 95th percentile seasonal temperatures observed in the Snake River upstream from the discharge. Temperature and pH data were obtained from receiving water monitoring required of the permittee under the previous permit and from the USGS station at Minidoka, Idaho (station #13081500). A reasonable potential calculation showed that the McCain discharge would have the reasonable potential to cause or contribute to a violation of the water quality criteria for ammonia from November through April. Therefore, the draft permit contains water quality-based effluent limits for ammonia for this season. The previous permit's effluent limits for ammonia in effect during the month of October were retained under the anti-backsliding provisions of the Act. The draft permit requires that the permittee monitor the receiving water for ammonia, pH and temperature. See Appendices D and E for reasonable potential and effluent limit calculations for ammonia.

Table C-2: Water Quality Criteria for Ammonia		
	Acute Criterion[1]	Chronic Criterion
Equations:	$\frac{0.275}{1+10^{7.204-pH}}+\frac{39}{1+10^{pH-7.204}}$	$\left(\frac{0.0577}{1+10^{7.688-pH}}+\frac{2.487}{1+10^{pH-7.688}}\right)\times MIN\left(2.85, 1.45\times 10^{0.028\times(25-T)}\right)$
Seasonal Results at 95th percentile pH(mg/L):		
November – April	1.23	0.661
May		0.586
June – September		0.390
October		0.624
Seasonal Results at pH = 8.5 (mg/L):		
November – April	2.14	1.09
May		0.965
June – September		0.642
October		1.03
Notes: 1. No seasonal variation was assumed for pH, therefore, there is no seasonal variation in the acute criterion (which is a function of pH only).		

Total Phosphorus – Outfall 001

The Lake Walcott TMDL requires reductions in total phosphorus loading from point sources. The wasteload allocation granted to the McCain facility in the Lake Walcott TMDL is 399 lb/day. EPA is required to include effluent limits which are consistent with available wasteload allocations from approved TMDLs. Calculations for the total phosphorus effluent limits in the draft permit are found in Appendix F.

Floating, Suspended and Submerged Matter – All Outfalls

The Idaho water quality standards require that surface waters of the State be free from floating, suspended or submerged matter of any kind in concentrations impairing designated beneficial uses. The draft permit contains a narrative limitation prohibiting the discharge of such materials.

Total Residual Chlorine – Outfall 001

EPA has determined that that the discharge from outfall 001 has the reasonable potential to cause or contribute to water quality standards violations for total residual chlorine, if the permittee adds chlorine to the wastewater for total or partial disinfection (i.e. in order to meet the effluent limitations for E. coli bacteria). Therefore, EPA has calculated quality-based effluent limits for total residual chlorine. EPA has determined reasonable potential to exceed water quality standards and calculated effluent limits on a year-round basis, rather than the seasonal approach used for ammonia.

EPA has calculated water quality-based chlorine effluent limits in this manner because chlorine is toxic to aquatic life at very low concentrations. The acute and chronic chlorine criteria are below the analytical quantitation limit for EPA-approved methods, and the chronic chlorine criterion has a much shorter averaging period (4 days) than does the chronic ammonia criterion (30 days). In order to better protect the receiving water from the toxic effects of chlorine, given the analytical uncertainty, the fact that chlorine is being discharged from multiple outfalls, and the fact that the chlorine criteria have short averaging periods and are not to be exceeded more than once every three years, EPA has used the more conservative approach of establishing effluent limits on a year-round basis.

Temperature – Outfall 001

EPA has retained the 32ºC maximum daily effluent temperature limitation from the previous permit, in compliance with the anti-backsliding requirements of Section 402(o) of the Clean Water Act. A reasonable potential analysis has shown that a discharge in compliance with this effluent limit will not cause or contribute to water quality standards violations for temperature and will have a very small impact on the temperature of the receiving water after mixing.

E. coli Bacteria – Outfall 001

Based on data submitted by the permittee at EPA's request, EPA has determined that the discharge from outfall 001 has the reasonable potential to cause or contribute to water quality standards violations for E. coli. Therefore, EPA has imposed water quality-based effluent limits for E. coli. EPA does not anticipate that IDEQ will grant a mixing zone for E. coli, therefore, the water quality-based effluent limits require that water quality standards for E. coli be met "end-of-pipe." See Table D-5, in Appendix D, for reasonable potential calculations for E. coli.

Total Residual Chlorine – Outfalls 002 and 004

Based on the past five years of effluent chlorine data, EPA has determined that the discharges from Outfalls 002 and 004 have the reasonable potential to cause or contribute to water quality standards violations for total residual chlorine. Therefore, EPA has calculated water quality-based effluent limits for total residual chlorine for these two outfalls. EPA has determined reasonable potential to exceed water quality standards and calculated effluent limits on a year-round basis, rather than the seasonal approach used for ammonia in Outfall 001.

EPA has calculated water quality-based chlorine effluent limits in this manner because chlorine is toxic to aquatic life at very low concentrations. The acute and chronic chlorine criteria are below the analytical quantitation limit for EPA-approved methods, and the chronic chlorine criterion has a much shorter averaging period (4 days) than does the chronic ammonia criterion (30 days). In order to better protect the receiving water from the toxic effects of chlorine, given the analytical uncertainty, the fact that chlorine is being discharged from multiple outfalls, and the fact that the chlorine criteria have short averaging periods and are not be exceeded more than once every three years, EPA has used the more conservative approach of establishing effluent limits on a year-round basis.

Appendix D: Reasonable Potential Calculations

The following describes the process EPA has used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of Idaho's federally approved water quality standards. EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001) to determine reasonable potential.

To determine if there is "reasonable potential" to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit. This section discusses how the maximum projected receiving water concentration is determined. EPA has also worked through the reasonable potential calculations for ammonia for critical receiving water flow and pH during the season of November through April as an example.

A. Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \text{(Equation D-1)}$$

where,

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = Maximum projected effluent concentration
C_u = 95th percentile measured receiving water upstream concentration
Q_d = Receiving water flow rate downstream of the effluent discharge = $Q_e + Q_u$
Q_e = Effluent flow rate[1]
Q_u = Receiving water low flow rate upstream of the discharge (i.e. 1Q10, 7Q10 or 30B3)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e Q_e + C_u Q_u}{Q_e + Q_u} \qquad \text{(Equation D-2)}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving stream. If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_e Q_e + C_u (Q_u \times MZ)}{Q_e + (Q_u \times MZ)} \qquad \text{(Equation D-3)}$$

[1] EPA has used the maximum effluent flow rate for outfall 001 and the 95th percentile effluent flow rate for outfalls 002 and 004.

Where MZ is the fraction of the receiving water flow available for dilution. In this case, pursuant to Section 060.01.e.iv of the Idaho WQS, the mixing zone is not to exceed 25% of the volume of the stream flow and MZ is equal to 25% (.25).

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \text{(Equation D-4)}$$

Equation 2 can be simplified by introducing a "dilution factor,"

$$D = \frac{Q_e + 0.25Q_u}{Q_e} \qquad \text{(Equation D-5)}$$

For each season, there are three values for the dilution factor based on critical flows: one based on the 1Q10 flow rate in the receiving stream and used to determine reasonable potential and wasteload allocations for acute aquatic life criteria, one based on the 7Q10 flow rate to determine reasonable potential and wasteload allocations for chronic aquatic life criteria (except ammonia), and one based on the 30B3 flow rate and used to determine reasonable potential and wasteload allocations for the chronic aquatic life criterion for ammonia.

Because the previous permit contained ammonia effluent limits with multiple tiers based on the flow rate of the receiving water, EPA has included two flow tiers for the season with the lowest receiving water flow rates (November through April). The dilution factors are presented in Tables D-1 and D-2:

Table D-1: Seasonal Dilution Factors in the Snake River for Outfall 001
(based on flows at USGS Station #13081500)

Season	**Acute Dilution Factor** (1Q10)	**Chronic Dilution Factor** (7Q10)	**Chronic Ammonia Dilution Factor** (30B3)
Full Year	10.5	12.7	---
November through April (Critical Flows)	10.5	12.7	15.5
November through April (River Flow ≥ 1100 CFS)	38.3	38.3	38.3
May	35.6	46.4	62.7
June through September	143	162	249
October	80.3	93.1	168

Table D-2: Dilution Factors in the Snake River for Outfalls 002 and 004
(based on flows at USGS Station #13081500)

Outfall	**Acute Dilution Factor** (1Q10)	**Chronic Dilution Factor** (7Q10)
002	20.7	25.3
004	22.0	27.0

After simplification, Equation 2 becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation D-6)}$$

Equation D-6 is the form of the mass balance equation that was used to determine reasonable potential and calculate wasteload allocations.

B. Maximum Projected Effluent Concentration

For pollutants subject to technology-based effluent limits, the technology-based maximum daily limit was used as the maximum projected effluent concentration (C_e). The technology-based effluent limit was used in this manner because water quality-based effluent limits are required only when a discharge of the pollutant at the technology-based limit has the reasonable potential to violate water quality standards.

For temperature, EPA has used the effluent limits in the previous permit as the maximum projected effluent temperature. Because EPA determined that a discharge in compliance with the effluent limits in the previous permit would not have the reasonable potential to cause or contribute to water quality standards violations, the previous effluent limits were retained under the anti-backsliding provisions of the Act.

For total residual chlorine from outfall 001, EPA has used a maximum projected effluent concentration of 1.0 mg/L (1000 µg/L). This is a literature value taken from the Water Pollution Control Federation's *Chlorination of Wastewater* (1976) which states that "satisfactory disinfection of secondary wastewater effluents generally can be obtained when the chlorine residuals after 15 to 30 min contact are between 0.2 and 1.0 mg/L." EPA has used the upper bound of the literature range as the maximum projected effluent concentration, because NPDES regulations require that reasonable potential analyses account for effluent variability. EPA uses a "worst case" estimate of the effluent concentration to account for effluent variability.

While these literature values are associated with disinfection of secondary treated municipal wastewater, effluent data submitted by the facility show that the McCain discharge has similar concentrations of bacteria to those typically observed in secondary treated municipal wastewater prior to disinfetion, according to EPA's *Design Manual for Municipal Wastewater Disinfection* (EPA/625/1-86/021). Therefore, it is reasonable to assume that contact times and residual chlorine concentrations similar to those typical for municipal wastewater will be necessary to disinfect the McCain discharge.

For E. coli, EPA has used the maximum single sample and maximum 30-day geometric mean E. coli concentrations measured in the effluent as the maximum projected effluent concentrations.

For other parameters, EPA has used the procedure described in section 3.3 of the TSD, "Determining the Need for Permit Limits with Effluent Monitoring Data." In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration in the mass balance equation. For ammonia, EPA has used a combination of the 99^{th} percentile of the effluent data and the previous permit's effluent limits (i.e. the 99^{th} percentile of the effluent data was used during seasons when no effluent limits were in effect under the previous permit).

Determining the Maximum Projected Effluent Concentration from Effluent Data

The 99th percentile effluent concentration is calculated by multiplying the maximum reported effluent concentration by a "reasonable potential multiplier" (RPM). The RPM is the ratio of the 99th percentile concentration to the maximum reported effluent concentration. The RPM is calculated from the coefficient of variation (CV) of the data and the number of data points.

The CV is defined as the ratio of the standard deviation of the data set to the mean, but when fewer than 10 data points are available, the TSD recommends assuming that the CV is equal to 0.6. Using the equations in section 3.3.2 of the TSD, the reasonable potential multiplier (RPM) is calculated as follows. The following discussion presents the equations used to calculate the RPM, and works through the calculations for the RPM for ammonia as an example. A summary of the reasonable potential calculations for all pollutants can be found in Table D-1.

First, the percentile represented by the highest reported concentration is calculated.

$p_n = (1 - \text{confidence level})^{1/n}$ (Equation D-7)

where,
p_n = the percentile represented by the highest reported concentration
n = the number of samples
confidence level = 99% = 0.99

EPA has obtained effluent data from the facility containing 1226 samples for ammonia:

$p_n = (1-0.99)^{1/1226}$
$p_n = 0 .996$

This means that we can say, with 99% confidence, that the maximum reported effluent TDS concentration is greater than the 99.6^{th} percentile.

The reasonable potential multiplier (RPM) is the ratio of the 99th percentile concentration (at the 99% confidence level) to the maximum reported effluent concentration. This is calculated as follows:

$RPM = C_{99}/C_p$ (Equation D-8)

Where,
$C = \exp(z\sigma - 0.5\sigma^2)$ (Equation D-9)

where,
$\sigma^2 = \ln(CV^2 + 1)$ (Equation D-10)
$\sigma = \sqrt{\sigma^2}$
CV = coefficient of variation = (standard deviation) ÷ (mean)
z = the inverse of the normal cumulative distribution function at a given percentile

In the case of ammonia:

CV = coefficient of variation = 5.111
$\sigma^2 = \ln(CV^2 + 1) = 3.300$

$\sigma = \sqrt{\sigma^2} = 1.817$
z = 2.326 for the 99th percentile = 2.674 for the 99.6th percentile

$C_{99} = \exp(2.326 \times 1.817 - 0.5 \times 3.300) = 13.15$
$C_{99.6} = \exp(2.674 \times 1.817 - 0.5 \times 3.300) = 24.71$

$RPM = C_{99}/C_{99.6} = 13.15/24.71$
RPM = 0.532

The maximum projected effluent concentration is determined by simply multiplying the maximum reported effluent concentration by the RPM:

Ce = (RPM)(MRC) (Equation D-11)
where MRC = Maximum Reported Concentration

In the case of ammonia,

C_e = (0.532)(29.1 mg/L) = **15.48 mg/L**

C. Maximum Projected Receiving Water Concentration

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the criterion. The maximum projected receiving water concentration is calculated from Equation D-6:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation D-6)}$$

In the case of ammonia, for the season from November through April for the acute criterion,

$$C_d = \frac{15.48 - 0.1}{10.5} + 0.1$$
C_d = 1.57 mg/L

And for the chronic criterion,

$$C_d = \frac{15.48 - 0.1}{15.5} + 0.1$$
C_d = 1.09 mg/L

In the case of ammonia, the projected receiving water concentrations (1.57 mg/L acute and 1.09 mg/L chronic) are greater than the criteria (an acute criterion of 1.23 mg/L and a chronic criterion of 0.661 mg/L) therefore a water quality-based effluent limit is required for this season and receiving water flow/pH condition.

Tables D-3 and D-4, on the following pages, summarize the reasonable potential calculations for all pollutant parameters and receiving water flow/pH conditions under consideration.

Table D-3: Reasonable Potential Calculations - McCain Foods Outfall 001
(All Pollutants Except Chlorine)

Common to All Parameters						
Confidence Level	0.99					
Z-Score of Confidence Level	2.33					
Dilution Factors	**Acute**	**Chronic**	**Ammonia Chronic**	**Fixed Flow (1100 CFS)**		
Nov-April	10.5	12.7	15.5	38.3		
May	35.6	46.4	62.7			
June - September	143	162	249			
October	80	93	168			
Parameter	**Ammonia (Critical pH) (mg/L)**	**Ammonia (Critical pH) (mg/L)**	**Ammonia (Median pH) (mg/L)**	**Ammonia (Median pH) (mg/L)**	**Nitrate + Nitrite (mg/L)**	**Temp. (ºC)**
Data Source	Effluent	Previous Eff. Limit	Effluent	Previous Eff. Limit	Effluent	Previous Effluent Limit
Maximum Reported Effluent Conc.	29.10				113.26	
Average Effluent Conc.	0.34				60.18	
Standard Deviation of Effluent Conc.	1.73				16.40	
Number of samples (n)	1226				280	
Coefficient of Variation (CV, assume 0.6 if n<10)	5.111				0.273	
Sigma	1.817				0.268	
Sigma^2	3.300				0.072	
Percentile of Largest Value	0.996				0.984	
Z-Score of Percentile of Largest Value	2.674				2.137	
C99	13.15				1.80	
Cn	24.71				1.709	
Reasonable Potential Multiplier (RPM)	0.532				1.052	
Maximum Projected Effluent Conc	15.48	Seasonal	15.48	Seasonal	119	32
November thru April (Critical Flows)						
Maximum Ambient Concentration	0.10	0.10	0.10	0.10	0.73	11.00
Maximum Acute RWC	1.57	6.66	1.57	6.66	12.06	13.01
Maximum Chronic/Single Value RWC	1.09	4.52	1.09	4.52	10.1	12.7
Acute Aquatic Life Criterion	1.23	1.23	2.14	2.14	N/A	32.00
Chronic Aquatic Life Criterion	0.66	0.66	1.09	1.09	N/A	29.00
Most Stringent Single-Value Criterion	N/A	N/A	N/A	N/A	100	N/A
Reasonable Potential?	**YES**	**YES**	**YES**	**YES**	**NO**	**NO**
May						
Maximum Ambient Concentration	0.10				0.73	16.40
Maximum Acute RWC	0.53				4.06	16.84
Maximum Chronic/Single Value RWC	0.34				3.3	16.7
Acute Aquatic Life Criterion	1.23				N/A	32.00
Chronic Aquatic Life Criterion	0.59				N/A	29.00
Most Stringent Single-Value Criterion	N/A				100	N/A
Reasonable Potential?	**NO**				**NO**	**NO**

Parameter	Ammonia (Critical pH) (mg/L)	Ammonia (Critical pH) (mg/L)	Ammonia (Median pH) (mg/L)	Ammonia (Median pH) (mg/L)	Nitrate + Nitrite	Temperature (*C)
Data Source	Effluent	Previous Eff. Limit	Effluent	Previous Eff. Limit	Effluent	Previous Effluent Limit
June thru September						
Maximum Ambient Concentration	0.10				0.73	22.72
Maximum Acute RWC	0.20				1.55	22.785
Maximum Chronic/Single Value RWC	0.16				1.5	22.777
Acute Aquatic Life Criterion	1.23				N/A	32.00
Chronic Aquatic Life Criterion	0.39				N/A	29.00
Most Stringent Single-Value Criterion	N/A				100	N/A
Reasonable Potential?	**NO**				**NO**	**NO**
October						
Maximum Ambient Concentration	0.10	0.10			0.73	15.43
Maximum Acute RWC	0.29	0.93			2.20	15.63
Maximum Chronic/Single Value RWC	0.19	0.50			2.0	15.6
Acute Aquatic Life Criterion	1.23	1.23			N/A	32.00
Chronic Aquatic Life Criterion	0.62	0.62			N/A	29.00
Most Stringent Single-Value Criterion	N/A	N/A			100	N/A
Reasonable Potential?	**NO**	**NO**			**NO**	**NO**
Ammonia, Nov-Apr, Flow > 1100 CFS						
Maximum Ambient Concentration	0.10	0.10	0.10	0.10		
Maximum Acute RWC	0.50	1.89	0.50	1.89		
Maximum Chronic/Single Value RWC	0.50	1.89	0.50	1.89		
Acute Aquatic Life Criterion	1.23	1.23	2.14	2.14		
Chronic Aquatic Life Criterion	0.66	0.66	1.09	1.09		
Most Stringent Single-Value Criterion	N/A	N/A	N/A	N/A		
Reasonable Potential?	**NO**	**YES**	**NO**	**YES**		

Table D-4: Reasonable Potential Calculations for Total Residual Chlorine			
Dilution Factors	Acute	Chronic	
Outfall 001	10.5	12.7	
Outfall 002	20.7	25.3	
Outfall 004	22.0	27.0	
All Concentrations in mg/L			
	Chlorine (Outfall 001)	Chlorine (Outfall 002)	Chlorine (Outfall 004)
Data Source	Literature Value	Effluent	Effluent
Maximum Reported Effluent Conc.		4.70	5.00
Average Effluent Conc.		0.24	0.43
Standard Deviation of Effluent Conc.		0.44	0.60
Number of samples (n)		321	321
Coefficient of Variation (CV, assume 0.6 if n<10)		1.808	1.388
Sigma		1.205	1.036
Sigma^2		1.451	1.074
Percentile of Largest Value		0.986	0.986
Z-Score of Percentile of Largest Value		2.191	2.191
C99		7.98	6.51
Cn		6.775	5.658
Reasonable Potential Multiplier (RPM)		1.178	1.151
Maximum Projected Effluent Conc.	1.0	5.54	5.76
Full Year			
Maximum Ambient Concentration	0.00	0.00	0.00
Maximum Acute RWC	0.096	0.27	0.28
Maximum Chronic/Single Value RWC	0.079	0.22	0.23
Acute Aquatic Life Criterion	0.019	0.019	0.019
Chronic Aquatic Life Criterion	0.011	0.011	0.011
Most Stringent Single-Value Criterion	N/A	N/A	N/A
Reasonable Potential?	**YES**	**YES**	**YES**

Table D-5: Reasonable Potential Calculations for E. Coli		
Date of Sample	**Daily E. Coli Value (# per 100ml)**	**30-day Geometric Mean**
8/3/2005	1000	N/A
8/8/2005	1	N/A
8/10/2005	300	N/A
8/15/2005	1	N/A
8/22/2005	1000	N/A
8/29/2005	1000	82
9/6/2005	**18000**	132
9/12/2005	400	373
9/19/2005	400	1236
9/27/2005	4000	1630
10/5/2005	8000	**2471**
10/10/2005	2000	1592
10/17/2005	200	1386
10/24/2005	1	418
10/31/2005	1	80
11/7/2005	800	117
11/14/2005	200	32
11/21/2005	1400	47
11/28/2005	1	47
Maximum Effluent Concentration	**18000**	**2471**
Criteria	**406**	**126**
Reasonable Potential?	**YES**	

Appendix E: WQBEL Calculations for Aquatic Life Criteria

The following calculations demonstrate how the water quality-based effluent limits (WQBELs) in the draft permit were calculated, when those limits are intended to protect aquatic life criteria. WQBELs for total phosphorus are calculated differently, as shown in Appendix F. The following discussion presents the general equations used to calculate the water quality-based effluent limits. EPA has also presented detailed calculations of the November through April ammonia WQBEL (for critical receiving water flow and pH) as an example. The calculations for all WQBELs based on aquatic life criteria are summarized in Table E-1.

A. Calculate the Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated using the same mass balance equations (Equations D-6 and D-7) used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis. To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation D-6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u \qquad \text{(Equation E-1)}$$

In the case of ammonia, for the acute criterion, from November through April

$$WLA_a = 10.5 \times (1.232 - 0.1) + 0.1$$
$$\mathbf{WLA_a = 12.0\ mg/L}$$

For the chronic criterion,

$$WLA_c = 15.5 \times (0.661 - 0.1) + 0.1$$
$$\mathbf{WLA_c = 8.80\ mg/l}$$

The next step is to compute the "long term average" concentrations which will be protective of the WLAs. This is done using the following equations from EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD):

$$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z\sigma) \qquad \text{(Equation E-2)}$$
$$LTA_c = WLA_c \times \exp(0.5\sigma_n^2 - z\sigma_n) \qquad \text{(Equation E-3)}$$

where,

$$\sigma^2 = \ln(CV^2 + 1)$$
$$\sigma = \sqrt{\sigma^2}$$
n = number of days in averaging period = 30
$$\sigma_{30}^2 = \ln(CV^2/30 + 1)$$
$$\sigma = \sqrt{\sigma_{30}^{\ 2}}$$
z = 2.326 for 99th percentile probability basis

In the case of ammonia,

$$\sigma^2 = \ln(5.111^2 + 1) = 3.300$$

$\sigma = \sqrt{\sigma^2} = 1.817$

$\sigma_{30}^2 = \ln(5.111^2/30 + 1) = 0.626$

$\sigma_{30} = \sqrt{\sigma_{30}^{\ 2}} = 0.791$

$z = 2.326$ for 99th percentile probability basis

Therefore,

LTA_a = 12.0 mg/L × exp(0.5 × 3.300 - 2.326 × 1.817)
LTA_a = 0.911

LTA_c = 8.80 mg/L × exp(0.5 × 0.626 - 2.326 × 0.719)
LTA_c = 1.918

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits, as shown below. For ammonia, the acute LTA is more stringent.

B. Derive the maximum daily and average monthly effluent limits

Using the TSD equations, the MDL and AML effluent limits are calculated as follows:

$MDL = LTA \times \exp(z_m\sigma - 0.5\sigma^2)$ (Equation E-4)
$AML = LTA \times \exp(z_a\sigma_n - 0.5\sigma_n^2)$ (Equation E-5)

where σ and σ^2 are defined as they are for the LTA equations (E-2 and E-3) and,

$\sigma_n^2 = \ln(CV^2/n + 1)$

$\sigma = \sqrt{\sigma_n^{\ 2}}$

$z_a = 1.645$ for 95th percentile probability basis

$z_m = 2.326$ for 99th percentile probability basis

n = number of sampling events required per month (equal to 4 because there is one sample required per week)

In the case of ammonia,

MDL = 0.911 mg/L × exp(2.326 × 1.817 - 0.5 × 3.300)
MDL = 12.0 mg/L

AML = 0.911 mg/L × exp(1.645 × 1.420 - 0.5 × 2.019)
AML = 3.44 mg/L

These concentrations were converted to mass limits by multiplying by the maximum effluent flow rate of the facility (4.77 mgd) and a conversion factor of 8.34.

Tables E-1 and E-2, on the following pages, detail the effluent limit calculations for all water quality-based effluent limits based on aquatic life water quality criteria.

Table E-1 Limits Based on 2-Value Aquatic Life Criteria (Outfall 001)

Statistical variables for permit limit calculation

PARAMETER	Season, Flow & pH	AML Prob'y Basis	MDL Prob'y Basis	LTA Prob'y Basis	# of Samples per Month	Acute Dil'n Factor	Chronic Dil'n Factor	Chronic Ammonia Dil'n Factor
		dimensionless			*n*	*dimensionless*		
All	Nov-April or Year-Round	0.95	0.99	0.99	4	10.45	12.65	15.5
Ammonia (mg/L)	Nov-Apr Flow > 1100 CFS	0.95	0.99	0.99	4	38.3	38.3	38.3
Ammonia (mg/L)	Nov-April Flow < 1100 CFS pH < 8.5	0.95	0.99	0.99	4	10.45	12.65	15.5

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations

PARAMETER	Season, Flow and pH	WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	Limiting LTA
		µg/L	*µg/L*	*µg/L*	*µg/L*	*decimal*	*µg/L*
Ammonia (mg/L)	Nov-April (critical flows)	12.0	8.8	0.911	1.92	5.111	0.89
Ammonia (mg/L)	Nov-Apr Flow > 1100 CFS	43.5	21.7	3.31	4.71	5.111	2.18
Ammonia (mg/L)	Nov-April Flow < 1100 CFS pH < 8.5	21.4	15.5	1.63	3.36	5.111	1.56
Chlorine	Year-Round	199	139.2	63.76	73.41	0.600	63.76

Effluent Limit Calculation Summary

PARAMETER	Season	Ambient Conc	Water Quality Criterion Acute	Water Quality Criterion Chronic	**Average Monthly Limit (AML)**	**Maximum Daily Limit (MDL)**	**Average Monthly Limit (AML)**	**Maximum Daily Limit (MDL)**
		µg/L	*µg/L*	*µg/L*	***µg/L***	***µg/L***	***lb/day***	***lb/day***
Ammonia (mg/L)	Nov-April (critical flows)	0.10	1.23	0.66	**3.44**	**12.0**	**137**	**476**
Ammonia (mg/L)	Nov-Apr Flow > 1100 CFS	0.10	1.23	0.66	**12.5**	**43.5**	**497**	**1732**
Ammonia (mg/L)	Nov-April Flow < 1100 CFS pH < 8.5	0.10	2.14	1.09	**6.16**	**21.4**	**245**	**853**
Chlorine	Year-Round	0.00	19	11	**99.0**	**199**	**3.94**	**7.90**

Table E-2: Limits Based on 2-Value Aquatic Life Criteria (Outfall 002)

Statistical variables for permit limit calculation

PARAMETER	Outfall	AML Prob'y Basis	MDL Prob'y Basis	LTA Prob'y Basis	# of Samples per Month	Acute Dil'n Factor	Chronic Dil'n Factor
		Decimal			*n*	*Dimensionless*	
Chlorine	002	0.95	0.99	0.99	4	20.69	25.28
Chlorine	004	0.95	0.99	0.99	4	22.05	26.95

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations

PARAMETER	Outfall	WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	Limiting LTA
		µg/L	*µg/L*	*µg/L*	*µg/L*	*decimal*	*µg/L*
Chlorine	002	393.1	278.1	49.3	62.1	1.808	49.3
Chlorine	004	418.9	296.5	64.3	83.9	1.388	64.3

Effluent Limit Calculation Summary

PARAMETER	Outfall	Ambient Conc	Water Quality Criterion Acute	Water Quality Criterion Chronic	**Average Monthly Limit (AML)**	**Maximum Daily Limit (MDL)**	**Average Monthly Limit (AML)**	**Maximum Daily Limit (MDL)**
		µg/L	*µg/L*	*µg/L*	***µg/L***	***µg/L***	***lb/day***	***lb/day***
Chlorine	002	0.00	19.00	11.00	**130**	**393**	**3.85**	**11.6**
Chlorine	004	0.00	19.00	11.00	**148**	**419**	**4.10**	**11.6**

Appendix F: WQBEL Calculations for Total Phosphorus

The effects of total phosphorus on a watershed are a function of the average loading. In contrast, the effects of pollutants such as ammonia and chlorine, which have toxic effects on aquatic life, are based on short term exposure (generally 1 hour for acute effects and 4 days for chronic effects). Therefore, it is not appropriate to calculate effluent limits for total phosphorus using the procedures shown in Appendix E, which are used for the protection of aquatic life criteria.

When the deleterious effects of a pollutant are based on long term average loading or concentration (as with human health criteria or nutrients), the TSD recommends setting the average monthly limit equal to the WLA. NPDES regulations at 40 CFR 122.45(d)(1) require that effluent limitations for continuous discharges from dischargers other than POTWs be expressed as average monthly and maximum daily limits, unless impracticable. Therefore, the TSD recommends calculating a maximum daily limit based on effluent variability from the following equation:

$$\frac{\text{MDL}}{\text{AML}} = \frac{\exp(z_m\sigma - 0.5\sigma^2)}{\exp(z_a\sigma_n - 0.5\sigma_n^{\ 2})}$$

Where:

- CV = Coefficient of variation = 0.451
- $\sigma^2 = \ln(CV^2 + 1) = 0.185$
- $\sigma = \sqrt{\sigma^2} = 0.430$
- $\sigma_n^{\ 2} = \ln(CV^2/n + 1) = 0.0495$
- $\sigma_n = \sqrt{\sigma_n^{\ 2}} = 0.223$
- n = number of sampling events per month = 8
  (a minimum of 4 samples is assumed if actual sample frequency is less than 4 per month)
- z_m = 2.326 for 99th percentile probability basis
- z_a = 1.645 for 95th percentile probability basis

This yields an MDL to AML ratio of 1.93:1. The WLA for total phosphorus from the Lake Walcott TMDL is 399 lb/day. Therefore, the average monthly limit is 399 lb/day and the maximum daily limit is 772 lb/day (399 lb/day × 1.93 = 772 lb/day).