9.0 GLOSSARY AND LIST OF ACRONYMS

9.1 GLOSSARY

Abundance	Number of organisms in a defined sampling unit, usually expressed as aerial coverage.
Acute	Acute refers to a stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96 hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute effect is not always measured in terms of lethality.
Ageing Structures	Parts of the fish which are taken for ageing analyses. These structures contain bands for each year of growth or maturity which can be counted. Some examples of these structures are scales, fin rays, otoliths and opercula. Most ageing structures can be taken with minimal effect on the fish and vary according to fish species.
Alkalinity	A measure of water's capacity to neutralize an acid. It indicates the presence of carbonates, bicarbonates and hydroxides, and less significantly, borates, silicates, phosphates and organic substances. It is expressed as an equivalent of calcium carbonate. The composition of alkalinity is affected by pH, mineral composition, temperature and ionic strength. However, alkalinity is normally interpreted as a function of carbonates, bicarbonates and hydroxides. The sum of these three components is called total alkalinity.
ANCOVA	Analysis of covariance. ANCOVA compares regression lines, testing for differences in either slopes or intercepts (adjusted means).
ANOVA	Analysis of Variance. An ANOVA tests for differences among levels of one or more factors. For example, individual sites are levels of the factor site. Two or more factors can be included in an ANOVA (e.g., site and year).
AOSERP	Alberta Oil Sands Environmental Research Program
Baseline	The term used to characterize data and information gathered from stations that are designated as reference.

Benthic invertebrates	Invertebrate organisms living on the bottom of lakes, ponds and streams. Examples of benthic invertebrates include the aquatic insects such as caddisfly larvae, which spend at least part of their life on or in bottom sediments. Many benthic invertebrates are major food sources for fish.
Benthos	Organisms that inhabit the bottom substrates (sediments, debris, logs, macrophytes) of aquatic habitats for at least part of their life cycle. The term benthic is used as an adjective, as in benthic invertebrates.
Bioaccumulation	A general term meaning that an organism stores within its body a higher concentration of a substance than is found in the environment. This is not necessarily harmful. For example, freshwater fish must bioaccumulate salt to survive in intertidal waters. Many toxicants, such as arsenic, are not included among the dangerous bioaccumulative substances because they can be handled and excreted by aquatic organisms.
Bioavailability	The amount of chemical that enters the general circulation of the body following administration or exposure.
Bioconcentration	A process where there is a net accumulation of a chemical directly from an exposure medium into an organism.
Biological Indicator (Bioindicator)	Any biological parameter used to indicate the response of individuals, populations or ecosystems to environmental stress. For example, growth is a biological indicator.
Biomonitoring	The use of living organisms as indicators of the quality and integrity of aquatic or terrestrial systems in which they reside.
Bitumen	A highly viscous, tarry, black hydrocarbon material having an API gravity of about 9° (specific gravity about 1.0). It is a complex mixture of organic compounds. Carbon accounts for 80% to 85% of the elemental composition of bitumen, hydrogen – 10% sulphur – 5%, and nitrogen, oxygen and trace elements the remainder.

BOD	Biochemical oxygen demand. The test measures the oxygen utilized during a specified incubation period for the biochemical degradation of organic material and the oxygen used to oxidize inorganic material such as sulfides and ferrous iron. Usually conducted as a 5-day test (i.e., BOD_5).
Bottom Sediments	Substrates that lie at the bottom of a body of water. For example, soft mud, silt, sand, gravel, rock and organic litter, that make up a river bottom.
Catch-Per-Unit	A measure which relates to the catch of fish, with a particular type of gear, per unit of time (number of fish/hour). Results can be given for a particular species or the entire catch. The results can reflect both the density and/or the vulnerability of the gear utilized, of a species in a particular system.
Chronic	Defines a stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of the organism. The measurement of a chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.
CL	Confidence limits. A set of possible values within which the true value will lie with a specified level of probability.
Colour	True colour of water is the colour of a filtered water sample (and thus with turbidity removed), and results from materials which are dissolved in the water. These materials include natural mineral components such as iron and calcium carbonate, as well as dissolved organic matter such as humic acids, tannin, and lignin. Organic and inorganic compounds from industrial or agricultural uses may also add colour to water. As with turbidity, colour hinders the transmission of light through water, and thus 'regulates' biological processes within the body of water.
Community	A set of taxa coexisting at a specified spatial or temporal scale.
Concentration	Quantifiable amount of a chemical in environmental medium, expressed as mass of a substance per unit volume (e.g., mg/L), or per unit sample mass (e.g., mg/g).

Concentration Units

Concentration Units	Abbreviation	Units
Parts per million	ppm	mg/kg or µg/g or mg/L
Parts per billion	ppb	µg/kg or ng/g or µg/L
Parts per trillion	ppt	ng/kg or pg/g or ng/L
Parts per quadrillion	ppq	pg/kg or fg/g or pg/L

Condition Factor — A measure of the plumpness or fatness of aquatic organisms. For oysters and mussels, values are based on the ratio of the soft tissue dry weight to the volume of the shell cavity. For fish, the condition factor is based on weight-length relationships.

Conductivity — A measure of a water's capacity to conduct an electrical current. It is the reciprocal of resistance. This measurement provides an estimate of the total concentration of dissolved ions in the water.

Contaminant Body Burdens — The total concentration of a contaminant found in either whole-body or individual tissue samples.

Covariate — An independent variable; a measurement taken on each experimental unit that predicts to some degree the final response to the treatment, but which is unrelated to the treatment (e.g., body size [covariate] included in the analysis to compare gonad weights of fish collected from reference and exposed areas).

CWQG — Canadian Water Quality Guidelines. Numerical concentrations or narrative statements recommended to support and maintain a designated water use in Canada. The guidelines contain recommendations for chemical, physical, radiological and biological parameters necessary to protect and enhance designated uses of water.

dam^3 — Cubic decameter, equal to 1000 m^3

Detection Limit — The lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank (that may be zero) with a specified confidence level of a given method and representative matrix.

Development Area	Any area altered to an unnatural state. This represents all land and water areas included within activities associated with development of the oil sands leases.
Discharge	In a stream or rive, the volume of water that flows past a given point in a unit of time (i.e., m^3/s).
Diversity	The variety, distribution and abundance of different plant and animal communities and species within an area.
DO	Dissolved oxygen, the gaseous oxygen in solution with water. At low concentrations it may become a limiting factor for the maintenance of aquatic life. It is normally measured in milligrams/litre, and is widely used as a criterion of receiving water quality. The level of dissolved oxygen which can exist in water before the saturation point is reached is primarily controlled by temperature, with lower temperatures allowing for more oxygen to exist in solution. Photosynthetic activity may cause the dissolved oxygen to exist at a level which is higher than this saturation point, whereas respiration may cause it to exist at a level which is lower than this saturation point. At high saturation, fish may contract gas bubble disease, which produces lesions in blood vessels and other tissues and subsequent physiological dysfunctions.
Drainage Basin	The total area that contributes water to a stream.
EC*p*	A point estimate of the concentration of test material that causes a specified percentage effective toxicity (sublethal or lethal). In most instances, the EC*p* is statistically derived by analysis of an observed biological response (e.g., incidence of nonviable embryos or reduced hatching success) for various test concentrations after a fixed period of exposure. EC25 is used for the rainbow trout sublethal toxicity test.
Ecological Indicator	Any ecological parameter used to indicate the response of individuals, populations or ecosystems to environmental stress.
Ecosystem	An integrated and stable association of living and non-living resources functioning within a defined physical location.
Environmental Impact Assessment	A review of the effects that a proposed development will have on the local and regional environment.

Evenness	A measure of the similarity, in terms of abundance, of different species in a community. When there are similar proportions of all species then evenness is one, but when the abundances are very dissimilar (some rare and some common species) then the value increases.
Exposure	The contact reaction between a chemical and a biological system, or organism.
Exposed	The term used in this report to describe aquatic resources and physical locations (i.e., stations, reaches) that may be affected by oil sands developments. The use of this term does not imply or presume that effects of oil sands developments are occurring or have occurred, but simply that data collected from these locations are to be designated as ***operational*** for the purposes of data analysis
Fauna	A term referring to an association of animals living in a particular place or at a particular time.
Fecundity	The number of eggs or offspring produced by a female.
Fecundity Index	The most common measure of reproductive potential in fishes. It is the number of eggs in the ovary of a female fish. It is most commonly measured in gravid fish. Fecundity increases with the size of the female.
Filter-Feeders	Organisms that feed by straining small organisms or organic particles from the water column.
Forage Fish	Small fish that provide food for larger fish (e.g., longnose sucker, fathead minnow)
Gonad	A male or female organ producing reproductive cells or gametes (i.e., female ovum, male sperm). The male gonad is the testis; the female gonad is the ovary.
Gonad Somatic Index (GSI)	The proportion of reproductive tissue in the body of a fish. It is calculated by expressing gonad weight as a percentage of whole body weight. It is used as an index of the proportion of growth allocated to reproductive tissues in relation to somatic growth.
GPS	Global Positioning System. This system is based on a constellation of satellites which orbit the earth every 24 hours. GPS provides exact position in standard geographic grid (e.g., UTM.)

Habitat	The place where an animal or plant naturally or normally lives and grows, for example, a stream habitat or a forest habitat.
Hardness	Total hardness is defined as the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate, in milligrams per litre.
IC*p*	A point estimate of the concentration of test material that causes a specified percentage impairment in a quantitative biological test which measures a change in rate, such as reproduction, growth, or respiration.
Inorganics	Pertaining to a compound that contains no carbon.
KIRs	Key indicator resources are the environmental attributes or components identified as a result of a social scoping exercise as having legal, scientific, cultural, economic or aesthetic value.
LC_{50}	Median lethal concentration. The concentration of a substance that is estimated to kill half of a group of organisms. The duration of exposure must be specified (e.g., 96-hour LC_{50}).
Lesions	Pathological change in a body tissue.
Lethal	Causing death by direct action.
Littoral Zone	The zone in a lake that is closest to the shore.
Liver Somatic Index (LSI)	Calculated by expressing liver weight as a percent of whole body weight.
m^3/s	Cubic metres per second. The standard measure of water flow in rivers; i.e., the volume of water in cubic metres that passes a given point in one second.
Macro-invertebrates	Those invertebrate (without backbone) animals that are visible to the eye and retained by a sieve with 500 µm mesh openings for freshwater, or 1,000 µm mesh openings for marine surveys (EEM methods).
mean annual flood	The average of the series of annual maximum daily discharges.
Microtox®	A toxicity test that includes an assay of light production by a strain of luminescent bacteria (*Photobacterium phosphoreum*).

MSC	Meteorological Service of Canada
Negative control	Material (e.g., water) that is essentially free of contaminants and of any other characteristics that could adversely affect the test organism. It is used to assess the 'background response' of the test organism to determine the acceptability of the test using predefined criteria.
NO_x	A measure of the oxides of nitrogen comprised of nitric oxide (NO) and nitrogen dioxide (NO_2).
Nutrients	Environmental substances (elements or compounds) such as nitrogen or phosphorus, which are necessary for the growth and development of plants and animals.
Oil Sands	A sand deposit containing a heavy hydrocarbon (bitumen) in the intergranular pore space of sands and fine-grained particles. Typical oil sands comprise approximately 10 wt% bitumen, 85% coarse sand (>44 µm) and a fines (>44 µm) fraction, consisting of silts and clays.
Operational	The term used to characterize data and information gathered from stations that are designated as exposed.
Organics	Chemical compounds, naturally occurring or otherwise, which contain carbon, with the exception of carbon dioxide (CO_2) and carbonates (e.g., $CaCO_3$).
PAH	Polycyclic Aromatic Hydrocarbon. A series of petroleum-related chemicals composed of at least two fused benzene rings. Toxicity increases with molecular size and degree of alkylation.
PAI	The Potential Acid Input is a composite measure of acidification determined from the relative quantities of deposition from background and industrial emissions of sulphur, nitrogen and base cations.
Pathological Index	A quantitative summary of pathology where variables examined are assigned numerical values (either 0, 10, 20 or 30) to indicate normal or abnormal condition. In this system, variables that exhibit an increasing degree of pathology are assigned higher values. The PI is calculated by summing the index values for each variable. The PI value increases as the number and severity of abnormalities increases. Based on the Health Assessment Index (HAI) developed by Adams *et al*. (1993).

Pathology	The science which deals with the cause and nature of disease or diseased tissues.
Peat	A material composed almost entirely of organic matter from the partial decomposition of plants growing in wet conditions.
PEL	Probable Effect Level. Concentration of a chemical in sediment above which adverse effects on an aquatic organism are likely.
pH	A measure of the acid or alkaline nature of water or some other medium. Specifically, pH is the negative logarithm of the hydronium ion (H_30^+) concentration (or more precisely, activity). Practically, pH 7 represents a neutral condition in which the acid hydrogen ions balance the alkaline hydroxide ions. The pH of the water can have an important influence on the toxicity and mobility of chemicals in pulpmill effluents.
Population	A group of organisms belonging to a particular species or taxon, found within a particular region, territory or sampling unit. A collection of organisms that interbreed and share a bounded segment of space.
ppt	Parts per thousand.
Quality Assurance (QA)	Refers to the externally imposed technical and management practices which ensure the generation of quality and defensible data commensurate with the intended use of the data; a set of operating principles that, if strictly followed, will produce data of known defensible quality.
Quality Control (QC)	Specific aspect of quality assurance which refers to the internal techniques used to measure and assess data quality and the remedial actions to be taken when data quality objectives are not realized.
Reach	A comparatively short length of river, stream channel or shore. The length of the reach is defined by the purpose of the study.
Receptor	The person or organism subjected to exposure to chemicals or physical agents.

Reference	The term used in this report to describe aquatic resources and physical locations that are not yet affected by oil sands developments and that data on aquatic resources collected from these locations are to be designated as ***baseline*** for the purposes of data analysis. The terms ***exposed*** and ***reference*** do not depend on location of the aquatic resource in relation to the location of the oil sands developments, but to the possible effects of oil sands developments that are being considered and the potential impact pathway. For example, Lake A29 (one of the ASL lakes) is characterized as ***reference*** with respect to possible effects on water quality via changes in hydrological conditions, but is designated as ***exposed*** with respect to possible effects related to acid deposition
Reference Toxicant	A chemical of quantified toxicity to test organisms, used to gauge the fitness, health, and sensitivity of a batch of test organisms.
Relative Abundance	The proportional representation of a species in a sample or a community.
Replicate	Duplicate analyses of an individual sample. Replicate analyses are used for measuring precision in quality control.
Riffle Habit	Shallow rapids where the water flows swiftly over completely or partially submerged materials to produce surface agitation.
Run Habitat	Areas of swiftly flowing water, without surface waves, that approximates uniform flow and in which the slope of water surface is roughly parallel to the overall gradient of the stream reach.
SD	Standard deviation.
SE	Standard error.
Sediments	Solid fragments of inorganic or organic material that fall out of suspension in water, wastewater, or other liquid.
Sentinel Species	A monitoring species selected to be representative of the local receiving environment.

Shannon-Weiner Diversity Index	A calculation used to estimate species diversity using both species richness and relative abundance. A basic count of the number of species present in a community represents species richness. The number of individuals of each species occurring in a community is the species relative abundance.
Spawning Habitat	A particular type of area where a fish species chooses to reproduce. Preferred habitat (substrate, water flow, temperature) varies from species to species.
Species	A group of organisms that actually or potentially interbreed and are reproductively isolated from all other such groups; a taxonomic grouping of genetically and morphologically similar individuals; the category below genus.
Species Richness	The number of different species occupying a given area.
Sport/Game Fish	Large fish that are caught for food or sport (e.g., northern pike, trout).
Stressor	An agent, a condition, or another stimulus that causes stress to an organism.
Sublethal	A concentration or level that would not cause death. An effect that is not directly lethal.
Suspended Sediments	Particles of matter suspended in the water. Measured as the oven dry weight of the solids in mg/L, after filtration through a standard filter paper. Less than 25 mg/L would be considered clean water, while an extremely muddy river might have 200 mg/L of suspended sediments.
Thalweg	The (imaginary) line connecting the lowest points along a streambed or valley. Within rivers, the deep channel area.
Tolerance	The ability of an organism to subsist under a given set of environmental conditions. Organisms with high tolerance to pollution are usually indicators of poor water quality.
Total Dissolved Solids	The total concentration of all dissolved compounds solids found in a water sample. See filterable residue.
Toxic	A substance, dose, or concentration that is harmful to a living organism.

Toxicity	The inherent potential or capacity of a material to cause adverse effects in a living organism.
Transect	A line drawn perpendicular to the flow in a channel along which measurements are taken.
TSS	Total suspended solids (TSS) is a measurement of the oven dry weight of particles of matter suspended in the water which can be filtered through a standard filter paper with pore size of 0.45 micrometres.
Turbidity	Turbidity in water is caused by the presence of matter such as clay, silt, organic matter, plankton, and other microscopic organisms that are held in suspension.
v/v	volume/volume - used to define dilution ratios for two liquids.
VOC	Volatile Organic compounds include aldehydes and all of the hydrocarbons except for ethane and methane. VOCs represent the airborne organic compounds likely to undergo or have a role in the chemical transformation of pollutants in the atmosphere.
Watershed	The entire surface drainage area that contributes water to a lake or river.
Wetlands	Term for a broad group of wet habitats. Wetlands are transitional between terrestrial and aquatic systems, whether the water table is usually at or near the surface or the land is covered by shallow water. Wetlands include features that are permanently wet, or intermittently water-covered such as swamps, marshes, bogs, muskeg, potholes, swales, glades, slashes and overflow land of river valleys.

9.2 LIST OF ACRONYMS

ADL	Analytical Detection Limit
AE, AENV	Alberta Environment
AEC	Alberta Economic Development
AEP	Alberta Environmental Protection
Albian	Albian Sands Energy Inc.
ALPAC	Alberta-Pacific Forest Industries
ANC	Acid Neutralizing Capacity
ANC_{org}	ANC attributable to weak organic acids
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
AOSERP	Alberta Oil Sands Environmental Research Program
ARC	Alberta Research Council
ARD	Athabasca River Delta
ARC-Vegreville	Alberta Research Council located in Vegreville
ASL	Acid Sensitive Lake
ASRD	Alberta Sustainable Resource Development
AWI	Alberta Wetland Inventory
AXYS	AXYS Analytical Services Ltd.
ALPAC	Alberta-Pacific Forest Industries Inc.
AUSRIVAS	Australian River Assessment System
Albian	Albian Sands Energy Inc.
BCI	Bray-Curtis Index
BOD	Biological Oxygen Demand
Birch Mountain	Birch Mountain Resources Ltd.

BPC	Big Point Channel
bpd	barrels per day
CA	Correspondence Analysis
CAEAL	Canadian Association for Environmental Analytical Laboratories
CCME	Canadian Council of Ministers of the Environment
CEA	Cumulative Effects Assessment
CEMA	Cumulative Environmental Management Association
CFIA	Canadian Food Inspection Agency
CIR	False-colour infrared
CL	Critical load
CNRL	Canadian Natural Resources Limited
CONRAD	Canadian Oil Sands Network for Research and Development
CPUE	Catch-per-unit-effort
CVAFS	cold vapor atomic fluorescence spectrophotometry
CWD	clean water discharge
CWQG	Canadian Water Quality Guidelines
Deer Creek	Deer Creek Energy Ltd.
Devon	Devon Canada Corporation
DFO	Fisheries and Oceans Canada
DIC	Dissolved inorganic carbon
DL	Detection limit
DO	Dissolved oxygen
DOC	Dissolved organic carbon
EEM	Environmental Effects Monitoring

EIA	Environmental Impact Assessment
ENGO	Environmental Non-Government Organization
EPEA	Environment Protection & Enhancement Act
EPI	External Pathology Index
EPT	sum of Ephemeroptera, Plecoptera and Trichoptera taxa
ETL	Enviro-Test Laboratories
EUB	Alberta Energy and Utilities Board
FLC	Fletcher Channel
FMA	Forest Management Agreement
FSA	Focus Study Area
FTC	Fletcher Channel
FWIN	Fall Walleye Index Netting
GIC	Goose Island Channel
GPS	Global Positioning System
GSI	Gonad Somatic Index
HAI	Health Assessment Index
HI	hazard index
HQ	hazard quotient
Hydroqual	Hydroqual Laboratories
Husky	Husky Energy
IBI	Index of Biotic Integrity
Imperial	Imperial Oil Resources
IQR	Inter-Quartile Range
IRC	Industry Relations Corporations
ISQG	Interim Freshwater Sediment Quality Guidelines

JACOS	Japan Canada Oil Sands Limited
KIR	Key Indicator Resource
LCS	Laboratory Control Sample
LSI	Liver Somatic Index
MDL	Method Detection Limit
MRRT	McMurray Resources (Research and Testing) Ltd.
MS-222	Tricaine methane sulfonate
MSC	Meteorological Service of Canada
Nexen	Nexen Canada Ltd.
NRBS	Northern River Basins Study
NSMWG	NOx and SOx Management Working Group
NWRI	National Water Research Institute
OPTI	OPTI Canada Inc.
PAD	Peace-Athabasca Delta
PAH	Polycyclic aromatic hydrocarbon
PAI	Potential Acidic Input
PC	Principal Component
PCA	Principal Components Analysis
Petro-Canada	Petro-Canada Oil and Gas
PI	Pathology Index
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAP	Quality Assurance Plan
QC	Quality Control
RAMP	Regional Aquatics Monitoring Program

RCA	Reference Condition Approach
RIVPACS	River Invertebrate Prediction and Classification System
RMWB	Regional Municipality of Wood Buffalo
RSA	Regional Study Area
RSDS	Regional Sustainable Development Strategy
SAGD	Steam Assisted Gravity Discharge
SBC	ratio of alkalinity to base cations
SD	Standard Deviation
SPSS	Statistical software Systat
STP	Sewage treatment plant
SWE	Snow water equivalent
SWI	Specific Work Instructions
Shell	Shell Canada Limited
Suncor	Suncor Energy Inc.
Syncrude	Syncrude Canada Ltd.
TCU	Total colour units
TDG	Transportation of Dangerous Goods
TDN	Total dissolved nitrogen
TDP	Total dissolved phosphorus
TDS	Total dissolved solids
TEEM	Terrestrial Environmental Effects Monitoring Committee
TEH	Total extractable hydrocarbon
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl nitrogen
TOC	Total organic carbon

TN	Total nitrogen
TP	Total phosphorus
TRH	Total recoverable hydrogen
TrueNorth	TrueNorth Energy L.P.
TSS	Total suspended solids
TVH	Total volatile hydrocarbon
USEPA	United States Environmental Protection Agency
UTF	Underground Test Facility
UTM	Universal Transverse Mercator
WBEA	Wood Buffalo Environmental Association
WHIMS	Workplace Hazardous Information Materials Information Systems
WSC	Water Survey of Canada
WWG	Water Working Group (CEMA)
YOY	Young of the Year