



US Army Corps of Engineers

Donlin Gold Project



Final Environmental Impact Statement

CEPOA-RD

P.O. Box 6898

JBER, AK 99506-0898

April 2018

Village of Crooked Creek

*Native Village of
Napaimute*

*Native Village of
Chuathbaluk*

Native Village of Aniak

Knik Tribal Council

Akiak Native Community

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DONLIN GOLD PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µm	micrometer
µN/m ²	microNewtons per square seter
µg	microgram
µg/m ²	micrograms per square meter
µg/m ² /y	micrograms per square meter per year
µS	micro Siemens
µPa	microPascals
3PPI	Three Parameters Plus, Inc.
AAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
AAOF	Army Airfield Operations Facility
AASHTO	American Association of State Highway and Transportation Officials
ABA	acid-base accounting
ABC	Alcoholic Beverage Control Board
ACMA	American Creek magnetic anomaly
ACS	American Community Survey
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADHSS	Alaska Department of Health and Social Services
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation & Public Facilities
ADOL	Alaska Department of Labor and Workforce Development
ADPS	Alaska Department of Public Safety
AEIC	Alaska Earthquake Information Center
AGRA	AGRA Earth & Environmental, Inc.
AHRS	Alaska Heritage Resource Survey
AKARNG	Alaska Army National Guard
AKEPIC	Alaska Exotic Plant Information Clearinghouse
AKNHP	Alaska Natural Heritage Program
ALFRESCO	Alaska Frame-Based Ecosystem Code Model
AMEC	AMEC Americas Limited
AMS	American Meteorological Society
AN	Alaska Native
ANCSA	Alaska Native Claims Settlement Act

ANILCA	Alaska National Interest Lands Conservation Act
ANTHC	Alaska Native Tribal Health Consortium
AP	acid-generation potential
APD&T	Alaska Petroleum Distributors and Transporters
APDES	Alaska Pollutant Discharge Elimination System
APE	area of potential effects
APNCU	adequacy of prenatal care utilization index
AQRV	air quality related value
AQS	air quality system
ARD	acid rock drainage
ASHSC	Alaska Seismic Hazards Safety Commission
AST	aboveground storage tank
ATR	Alaska Trauma Registry
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AVCP	Association of Village Council Presidents
AVCS	Alaska Vegetation Classification System
AVEC	Alaska Village Electric Cooperative
AVO	Alaska Volcano Observatory
AWQC	applicable/ambient water quality criteria
AWS	aircraft warning station
BACT	best available control technology
BAFs	bioaccumulation factors
BART	best available retrofit technology
BGC	BGC Engineering, Inc.
BIA	Bureau of Indian Affairs
BLEVE	boiling liquid expanding vapor explosion
BLM	Bureau of Land Management
BMC	Bethel Municipal Code
BMP	best management practice
BNC	Bethel Native Corporation
BOG	Alaska Board of Game
BPL	Beluga Natural Gas Pipeline
BRFSS	Behavioral Risk Factor Surveillance System
BSCF	billion standard cubic feet
BSWI	Bering Sea Western Interior
BTC	Birch Tree Crossing
BVS	Bureau of Vital Statistics
BW	body weight

ca.	circa (meaning "around, about," "approximately")
CAA	Clean Air Act
Calista	Calista Corporation (An ANCSA Regional Corporation)
CALTRAN	California Department of Transportation
CAM	compliance assurance monitoring
CASTNET	clean air status and trends network
CCBO	Crooked Creek below Omega
CCME	Canadian Council of Ministers of the Environment
CDC	Center for Disease Control
CDQ	Community Development Quota
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGMIX	Coast Guard Maritime Information Exchange
CH ₄	methane
Chadux	Alaska Chadux Corporation
CI ICE	compression ignition internal combustion engines
CIL	Carbon-in-Leach
CIMMC	Cook Inlet Marine Mammal Council
CISPRI	Cook Inlet Spill Prevention & Response, Inc.
CIRI	Cook Inlet Region, Inc. (an ANCSA Regional Corporation)
CISWI	commercial and industrial solid waste incineration
CKMP	Central Kuskokwim Moose Plan
CLE	contingency-level event
CLRD	chronic lower respiratory diseases
cm	centimeter
CMAQ	EPA Community Modeling Air Quality system
CMP	Compensatory Mitigation Plan (wetlands), Comprehensive Management Plan (cultural resources)
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ -e	equivalence to CO ₂ , CO ₂ equivalent
Code	International Cyanide Management Code
COPCs	chemicals of potential concern
COPD	chronic obstructive pulmonary disease

Corps	U.S. Army Corps of Engineers
CPUE	catch per unit effort
CRMP	Cultural Resources Management Plan
CSM	conceptual site model
CVAFS	cold vapor atomic fluorescence spectrometry
CVRF	Coastal Villages Region Fund
CWA	Clean Water Act
CWD	contact water dam
CY	cubic yards
dB	decibels
dBA	A-weighted decibel
DCCED	Alaska Department of Commerce, Community and Economic Development
DEM	digital elevation model
DGGS	Division of Geological and Geophysical Survey
DI	Deionized Water
DMA	Duane Miller Associates
DMLW	Division of Mining, Land and Water
DO	dissolved oxygen
Donlin Gold	Donlin Gold, LLC
DOC	Department of Corrections
DOI	Department of the Interior
DPS	distinct population segment
DRO	diesel range organics
DST	dry stack tailings
dvs	deciviews
EAP	Emergency Action Plan
EDR	effective detection radius
EDRR	Early Detection and Rapid Response
EFH	essential fish habitat
EIA	Energy Information Administration
EIS	environmental impact statement
EPA	Environmental Protection Agency
EPA CCC	EPA Criterion Continuous Concentration
EPCRA	Emergency Planning and Community Right to Know Act
ERA	ecological risk assessment
ESA	Endangered Species Act
ESCP	erosion and sediment control plan
FAA	Federal Aviation Administration

FCI	functional capacity index
FNWA RCNM	Federal Highway Administration Roadway Construction Noise Model
FLPMA	Federal Land Policy and Management Act
FMEA	failure mode effects analysis
FOS	factor of safety
FPPA	Farmland Protection Policy Act
FRP	facility response plan
FSA	Federal Scout Armory
ft/d	feet per day
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
FWD	fresh water dam
FWDD	fresh water diversion dam
GCMs	global climate models
GED	general educational development
GHG	greenhouse gas
GIS	geographical information system
GMU	game management unit
gpd	gallons per day
gpm	gallons per minute
GRO	gasoline range organics
GUA	guided use area
GWP	global warming potential
HAP	hazardous air pollutant
HACCP	Hazard Analysis and Critical Control Point
HCA	high consequence area
HCTs	Humidity cell tests
HDD	horizontal directional drilling
HEC	Health Effects Criteria/Categories
HFCs	hydrofluorocarbons
Hg	mercury
Hg ⁰	elemental mercury vapor
Hg ^{II}	gaseous divalent mercury
Hg _p	particulate-bound mercury
HgS	cinnabar
HGM	hydrogeomorphic
HIA	Health Impact Assessment
HMH	HMH Consulting, LLC

HPSA	Health Professional Shortage Area
HQs	hazard quotients
HQ _{NOAEL} :	hazard quotient no observable adverse effect level
HQ _{loael} :	hazard quotients low adverse effect level
HRC	high rate clarifier
HRSA	Health Resource and Services Administration
HUC	hydrologic unit code
ICMM	International Council on Mining and Metals
IDF	inflow design flood
IFC	International Finance Corporation
IHS	Indian Health Services
IIR	incident investigation report
ILI	in-line inspection
IMDG Code	International Maritime Dangerous Goods Code
IMP	integrity management program
IMPLAN	impact analysis for planning
IMPROVE	interagency monitoring of protected visual environments
INHT	Iditarod National Historic Trail
IPCC	Intergovernmental Panel on Climate Change
ISMP	Invasive Species Management Plan
ISO	International Standards Organization
ISQG	interim sediment quality guidelines
IWC	International Whaling Commission
IWMP	Integrated Waste Management Permit
JDWET	jurisdictional wetland classification
K	hydraulic conductivity
KFL	known fossil localities
kg	kilogram
km	kilometer
kPa	kilopascal
KAP	Kuskokwim Area Plan
KOPs	key observation points
KPB	Kenai Peninsula Borough
KRSMWG	Kuskokwim River Salmon Management Working Group
KTC	Knik Tribal Council
kV	kilovolt
LDR	land disposal restriction
LEDPA	least environmentally damaging practicable alternative

LEO Network	Local Environmental Observer Network
LEQ	equivalent sound level
LDN	day-night sound level
LLC	limited liability corporation
LLDPE	linear low-density polyethylene
L _{max}	maximum L _{EQ}
LNG	liquefied natural gas
LOEC	lowest observed effect concentrations
LOD	limit of detection
LSA	Little South America
LUSTs	leaking underground storage tanks
L _v	vibration level
LWC	lands with wilderness characteristics
m	meter
m ²	square meter
m ³	cubic meter
MAAT	mean annual air temperature
MACT	maximum achievable control technology
MAG	mitigation advisory group
Magnuson- Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MAOP	maximum allowable operating pressure
Mat-Su	Matanuska-Susitna
MBTA	Migratory Bird Treaty Act
MCE	maximum credible earthquake
MCL	maximum containment levels
MDAG	mine drainage assessment group
MDE	maximum design earthquake
MDL	method detection limit
MDN	mercury deposition network
MET	meteorology
MeHg	methyl mercury
MFP	management framework plan
mg/kg	milligrams per kilogram
Mgal	million gallons
mi	miles
mi ²	square mile
MISLE	Marine Information for Safety and Law Enforcement
ML	metal leaching

MLA	Mineral Leasing Act
MLLW	mean lower low water
MLV	mainline block valve
mm	millimeter
MMA	McVehil-Monnett Associates, Inc.
MMBtu/hr	million British thermal units per hour
MMPA	Marine Mammals Protection Act
MMT	million metric tons (1,000,000 tonnes)
MP	milepost
mph	miles per hour
MS	material sites
MSB	Matanuska-Susitna Borough
MSBC	Matanuska-Susitna Borough Code
MSDS	Material Data Safety Sheet
MSES	Management and Solutions in Environmental Science
MSGP	multi-sector general permit
MSHA	Mine Safety and Health Administration
MSL	mean sea level
Mt	million tons (short tons)
MT	metric tonne (a unit of weight equal to 1,000 kilograms or 2,204.6 pounds)
MUA	Medically Underserved Area
MUA	Medically Underserved Population
MW	megawatt
MWMP	meteoric water mobility procedure
N ₂ O	nitrous oxide
na	not available
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAG	non-acid generating
NANA	Northwest Alaska Native Association (an ANCSA Regional Corporation)
NAS	New Air Station
NBD	non-directional beacon
NCES	National Center for Education Statistics
ND	not detected
NDSA	Naval Defensive Sea Area
NEPA	National Environmental Policy Act

NES	Northern Ecological Services
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
ng/g	nanograms per gram
ng/L	nanograms per liter
ng/m ³	nanograms per cubic meter
ng/scm	nanograms per standard cubic meter
NH ₃	ammonia
NHD	National Hydrography Database
NHPA	National Historic Preservation Act
NISC	National Invasive Species Council
NLCD	National Land Cover Database
NLUR	Northern Land Use Research
NMFS	National Marine Fisheries Service
NNIS	nonnative invasive species
NNSR	nonattainment NSR
NRMS	normalized root mean square
NO	nitric oxide
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NOAA	National Oceanic and Atmospheric Administration
NOB	north overburden stockpile
NOI	Notice of Intent
NP	acid-neutralization potential
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	new source review
NTN	National Trends Network
NTSA	National Trails System Act
NTSB	National Transportation Safety Board
NTU	Nephelometric Turbidity Units
NWAB	Northwest Arctic Borough
NWI	National Wetlands Inventory
NWIS	National Water Information System
NWR	National Wildlife Refuge
NWS	National Weather Service
NWS COOP	NWS Cooperative

O ₃	ozone
O&M	operations and maintenance
OBE	operating basis earthquake
OCS	Alaska Office of Children's Services
ODPCP	Oil Discharge and Prevention Contingency Plan
OHMP	Office of Habitat Management and Permitting
OHV	off-highway vehicle / off-road vehicle
OLE	operating-level earthquake
OMS	organizational maintenance shop
OPA	Oil Pollution Act
ORV	off-road vehicle/off-highway vehicle
OSHA	Occupational Safety & Health Administration
OSRO	oil spill removal organization
PA	Programmatic Agreement
PAG	potentially acid generating
PAHs	polyaromatic hydrocarbons
Pb	lead
PCR	project control room
PELs	probable effects levels
PFCs	perfluorocarbons
PFL	potential fossil localities
PFYC	Potential Fossil Yield Classification
PG&E	Pacific Gas and Electric
pg/m ³	picograms per cubic meter
PGA	peak ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PJD	Preliminary Jurisdictional Delineation
PM	particulate matter
PM ₋₁₀	PM with an aerodynamic diameter less than or equal to 10 µm
PM _{-2.5}	PM with an aerodynamic diameter less than or equal to 2.5 µm
PMF	probable maximum flood
PMP	probable maximum precipitation
POD	Plan of Development
POA	Port of Anchorage
POX	pressure oxidation
ppb	parts per billion
ppm	parts per million
PPV	peak particle velocity
PRISM	parameter elevation regressions on independent slope models

PSD	Prevention of Significant Deterioration
psi	pounds per square inch
PSI	periodic safety inspections
PSIO	Petroleum Systems Integrity Office
PSR	Pipeline Safety Regulations
PSY	Pipe and Equipment Storage Yards
PTE	potential to emit
QAPP	Quality Assurance Project Plan
RAC	Regional Advisory Council
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably Foreseeable Future Actions
RECON	Rowland Engineering Consultants
RFAI	request for additional information
RFS	renewable fuel standards
RHA	Rivers and Harbors Act
RICE	reciprocating internal combustion engines
RMP	Risk Management Plan, Resource Management Plan
RMS	root mean square
RO	reverse osmosis
ROD	Record of Decision
ROW(s)	right(s)-of-way
RPT	rapid phase transition
RRO	residual range organics
SAG	semi-autonomous grinding
SBD	strain-based design
SBRA	simultaneous broadcast range adcock antenna
SCA	secondary containment area
SDH	Social Determinants of Health
SDWA	Safe Drinking Water Act
sf	square feet
SF ₆	sulfur hexafluoride
SHPO	State Historical Preservation Officer
SI ICE	spark ignition internal combustion engines
SIP	state implementation plan
SMAP	Susitna Matanuska Area Plan
SNAP	scenarios network for Alaska planning
SO ₂	sulfur dioxide
SODAR	sonic detection and ranging
SOB	south overburden stockpile

SPCC	Spill Prevention Control and Countermeasure
SPCO	State Pipeline Coordinator's Office
SPL	sound pressure level
SpUD	special use district
SQGs	Sediment Quality Guidelines
SQRU	scenic quality rating unit
SREB	snow removal equipment building
SRK	SRK Consulting (US), Inc.
SRR	Stabilization, Rehabilitation, and Reclamation Plan
SRS	seepage recovery system
SSA	sole source aquifer
SSAP	Southeast Susitna Area Plan
SME	State Medical Examiner
SSI	sewage sludge incineration
STATSGO	State Soil Geographic Database
STI	sexually transmitted infection
STPs	sewage treatment plants
SWE	snow water equivalent
SWPPP	Stormwater Pollution Prevention Plan
t	ton, short ton (a unit of weight equal to 2,000 pounds)
TAPS	Trans-Alaska Pipeline System
TCLP	toxicity characteristic leaching procedure
TCP	Traditional Cultural Properties
TDML	total maximum daily load
TDS	totally dissolved solids
TEK	traditional ecological knowledge
TEls	threshold effects levels
TES	threatened or endangered species
TKC	The Kuskokwim Corporation
TMDL	Total Maximum Daily Load
TOC	total organic carbon
tpd	tons per day
tpy	tons per year
Tribe	federally recognized tribal government
TSCA	Toxic Substances Control Act
TSF	tailings storage facility
TUP	Temporary Use Permit
TWUP	temporary water use permit
UAA	University of Alaska, Anchorage

UCO	Unalaska Code of Ordinances
UCL	upper confidence limit
ULSD	ultra-low sulfur diesel
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USC	United States Code
USCG	U. S. Coast Guard
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USDA SCS	USDA Soils Conservation Service
USDOI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
USPS	U.S. Postal Service
USTs	underground storage tanks
UTM	Universal Transverse Mercator
VdB	vibration decibels
VOC	volatile organic compound
VPSO	Village Public Safety Officer
VRI	visual resources inventory
VRM	Visual Resource Management
WAD	weak acid dissociable
WBM	water balance model
WDAP	Wastewater Discharge Authorization Program
WEG	wind erodibility group
WELTS	well log tracking system
WHO	World Health Organization
WMO	World Meteorological Organization
WMRP	Water Resource Management Plan
WPR	world population review
WQS	water quality standards
WRF	waste rock facility
WRMCs	waste rock management categories
WT	wall thickness
WTP	water treatment plant
WT/TSF	waste treatment/ tailings storage facility
YK, Y-K	Yukon-Kuskokwim
YKHC	Yukon-Kuskokwim Health Center/Corporation