



# WEAR Methodology

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## Waste Erosion Assessment and Review (WEAR)

**Final Report**



**Solid Waste Program,  
Alaska Department of Environmental Conservation**



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# Project Overview

- Funding through Coastal Impact Assistance (CIAP)
- 4-year project
- Assess, inventory, prioritize landfills, contaminated sites & other environmental concern sites (tank farms, city shops, waste staging areas, etc.)
- Alaska's northern & western coastline, Aleutian Islands & river communities (300 miles from coast)
- Sites ranked on potential erosion & contaminant risks

**Inspected 716 sites  
in 124 communities**



# Risk Calculations

## Erosion Risk

- *2009 Alaska Baseline Erosion Assessment* USACE, Alaska District
- Desktop assessment
- Field measurements & observations

## Contaminant Risk

- Site assessment
- Toxicology
- Exposure pathways
- Human & ecological risk assessment



# Data Collected

- Site information
- Size of site
- Years of operation
- Possible contaminants
- Drinking water protection zone
- Distance to critical habitat
- Distance to residences
- Distance to stressed habitat
- Years until erosion
- Erosion type
- Erosion factors
- Erosion symptoms
- Soil Class
- Mitigation efforts

**WEAR Project  
Site Information Form**

Inspector: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Community</b>							
<b>Site name</b>							
<b>Site Type</b>				Landfill, Tank Farm, Drum Dump, Military, Mining			
<b>Status</b>				Active/Open, Covered/Closed, Remed/Remediated			
<b>Location</b>							
Latitude:				Longitude:			
				GPS Point ID's:			
<b>Description:</b>							
Approx. Size (acres):				Years Operated:			
<b>Possible Contaminants:</b>				Municipal Waste, Refs, Mining Waste, C&D/Waste, Military Waste, Industrial Waste, Other			
<b>Distance to (ft):</b>							
<b>Active Erosion:</b>				<b>Closest Water:</b>		<b>Name:</b>	
						Anadromous water body?	
<b>Subsistence Area:</b>				<b>Critical Habitat:</b>		USFW	
<b>Residences:</b>				<b>Stressed Habitat:</b>			
<b>Exposure Pathways:</b>				Inhalation, Direct Contact, Wildlife, Other			
<b>Erosion:</b>							
<b>Type:</b>				Wave, Currents, Ice, Heat, Wind, Precipitation, Seepage			
<b>Factors:</b>				Tides, Storm Surge, Flooding, Permafrost, Human Interference, Other			
<b>Symptoms:</b>				Slides, Undercutting, Scarp, Spool, Permafrost, Root Spawning/Slip, Ties, Wave Spool, Ice Gouging, Other			
<b>NRCS Soil Classification:</b>							
<b>Silt %</b>	<b>Clay %</b>	<b>Cobble %</b>	<b>Organics %</b>				
<b>Sand %</b>	<b>Gravel %</b>	<b>Boulder %</b>	<b>Loam %</b>				
<b>Erosion Rate:</b>		<b>Erosion Rate QA:</b>		Reported, Calculated, BIA Calculated			
<b>Current Erosion Mitigation Efforts:</b>							
<b>Drinking Water:</b>							
<b>Is the site in a drinking water protection area? If Yes:</b>							
<b>1" Source Name:</b>		<b>2" Source Name:</b>					
<b>Type:</b>		<b>Type:</b>		Surface Water, Groundwater			
<b>Treatment:</b>		<b>Treatment:</b>		Filtration, UV, Chlorination, Reverse Osmosis, Nanofiltration			
<b>Well Depth (ft.):</b>		<b>Protection Zone:</b>		Zone A, Zone B, Zone C, Zone E, Zone F			
<b>If No:</b>							
<b>Distance to Drinking Water Protection Area:</b>				Upgradient or Downgradient			

# Scoring

Weighting factors for relative importance

- 1 - important
- 2 – more important
- 3 – most important

Multipliers corresponding to relative risk

- Higher # = higher potential risk

**Weighting Factor x Multiplier = Score**

	Weight	Multiplier	Characteristics Considerations & References		Possible Score
	1-important; 2-more; 3-most	Higher # corresponds to higher risk			
WEAR Status	3				
Removed		0	Waste removed		0
Closed/Covered		2	Closed and covered	No longer accumulating waste but all waste remains	6
Inactive		3	left in place; all waste remains; potential responsible party		9
Abandoned		3	Left in place; all waste remains; no responsible party	No longer accumulating waste, no cover, maintenance, etc.	9
Active/open		4	Actively accumulating waste	Increasing waste	12
Size	3				
Small		1	Approximately 0-1 acre	Small, limited waste	3
Med		2	>1 acre, but <5 acres	Minimal waste	6
Possible Contaminants	3				
Burning		1	Burning of waste at any point in time	Air quality issue & formation of hazardous ash	3
Fuels		1	Fuels (gasoline, diesel, heating fuel)	Based upon relative toxicity of suspected contaminants	3
C&D/Asbestos		2	Demolition debris presumably containing asbestos		6
Municipal Waste		3	Household waste		9
Sewage		3	Human waste		9
Mining Waste		4	Metals, acid generating rock (AGR)		12
Industrial Waste		5	Mixed wastes, haz waste, fuels		15
Military Waste		6	Military waste, mixed wastes, haz waste, fuels		18



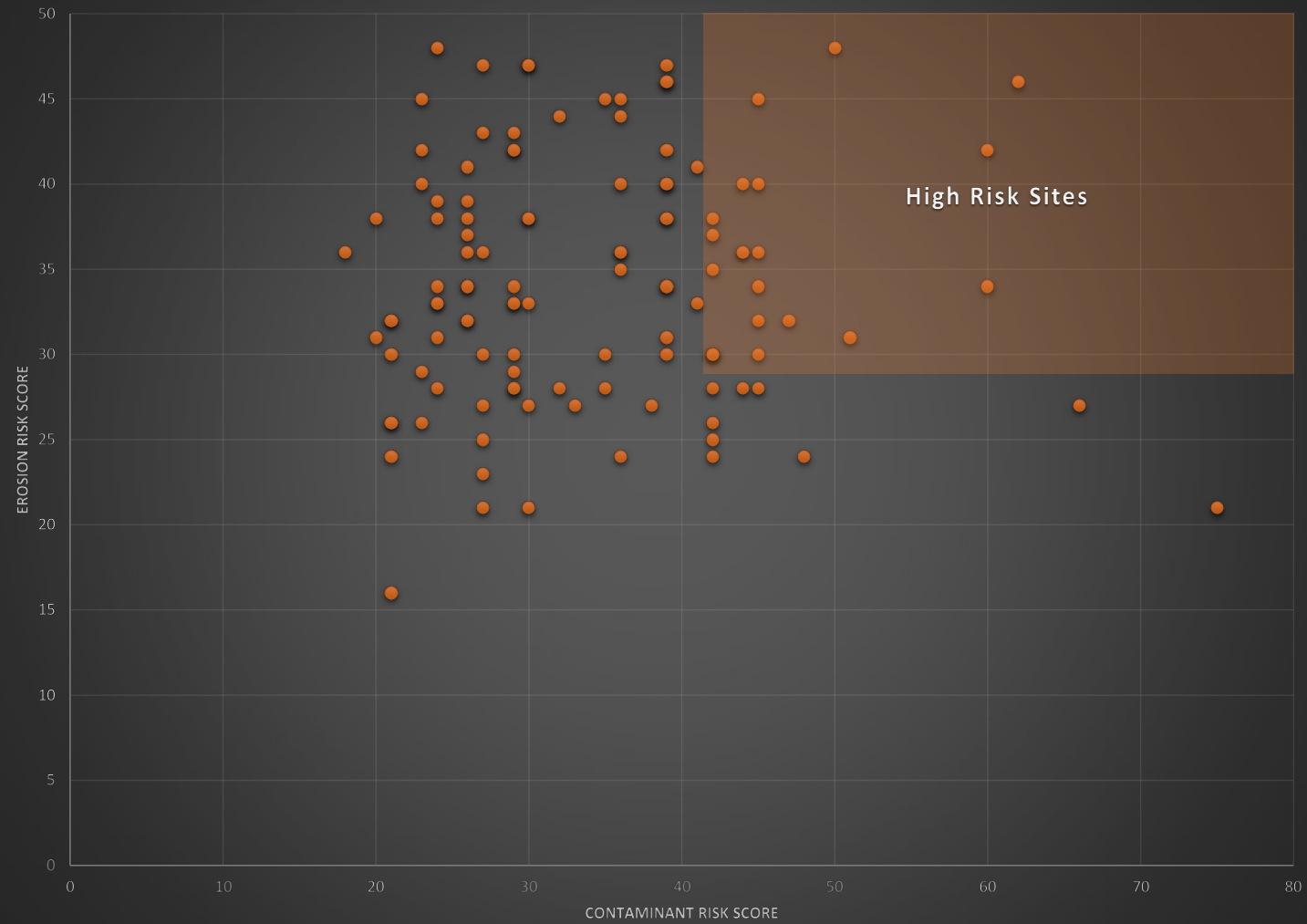
# Solid Waste Information System (SWIMS)

100% 50% 25% 10%			Find   Next																													
SITE INFORMATION				RISK FACTORS				DISTANCE TO (ft)				EROSION		SOIL		DRINKING WATER SOURCES						TANKS		CONTAMINATION								
Site Name	Waste Type	Waste Status	Acres	Years Of Operation	Years to Erosion	Contaminant Score	Erosion Score	Distance To Erosion	Distance To Hazardous Waste	Distance To Critical Habitat	Distance To Reservoirs	Distance To Water Body	Water Body Name	Erosion Rate	Erosion Rate GA	Erosion Mitigation	Soil	Clay	Gravel	Sand	Organics	Loam	Primary	Name	Dr Type	Treatment	Depth	Protection Zone	Tanks	Possible Contaminants		
Adak Finger Bay Landfill	Landfill	Covered/Closed	1.4	1972-1999	100+	39	10	1800	1820	1	999	9100	640	Local Creek	0	Reported	False		100												CDD/Asbestos, Fuel, Municipal Waste	
Adak Husky Road Landfill	Landfill	Active/Open	2	2000-present	100+	42	10	3600	3600	1	999	15500	1400	Unnamed Lake	0	Reported	False		100												Burning, CDD/Asbestos, Municipal Waste	
Adak Naval Air Station Metals Landfill	Landfill	Covered/Closed	60	1940s-1999	10	75	21	1	1	1	999	130	1	Kulak Bay	0	Reported	True		100												CDD/Asbestos, Fuel, Waste, Municipal Waste, Sewage	
Adak Naval Station Palisades Landfill	Landfill	Covered/Closed	4	1940s-early 1970s	100+	80	12	350	350	1	999	11200	350	Kulak Bay	0	Reported	True		100												CDD/Asbestos, Fuel, Waste, Municipal Waste	
Adak NG-GA Cemetery Landfill	Landfill	Covered/Closed	3	1940s-1980s	100+	39	10	85	85	1	999	28000	85	Kulak Bay	0	Reported	False		100												CDD/Asbestos, Municipal Waste	
Adak Roberts Landfill	Landfill	Covered/Closed	12	1950-2002	100+	42	10	3200	3200	1	999	7800	3200	Sweeper Cove	0	Reported	False		100												CDD/Asbestos, Municipal Waste	
Adak South Davis Rd Landfill	Landfill	Covered/Closed	3	1940-1950	100+	30	10	7000	7000	1	999	24000	0	Andrew Lake	0	Reported	False		100												CDD/Asbestos	
Adak White Alice Site	Military	Covered/Closed	10.8	1950s-1980s	100+	61	10	5500	5500	1	999	14500	5500	Shagok Bay	0	Reported	False		100												CDD/Asbestos, Military Waste	
Akakchik Landfill	Landfill	Active/Open	1	2005-current	100+	32	33	3400	3100	450000	5	1950	2050	Kuskokwim River	10	Reported	False	60													Burning, Municipal Waste	
Akakchik Old Elementary School Tank Farm	Tank Farm	Abandoned	0.1	1970s-2000	100+	41	34	1800	223	450000	5	480	223	Kuskokwim River	10	Reported	False	90					True	Well 1	Groundwater	Unknown	300	Zone B	Diesel and Gasoline (14 tanks) 910000, "Permanently Closed 2008" (Yupik School District)	Fuels		
Akakchik Old Power Plant Tank Farm	Tank Farm	Abandoned	0.11	1970s-2008	100+	44	23	1800	1820	450000	1	300	700	Kuskokwim River	10	BEA Calculated	False	40	60				True	Well 1	Groundwater	Unknown	300	Zone A			Fuels	
Akakchik Tank Farm	Tank Farm	Active/Open	0.27	2005-current	24	24	39	240	240	450000	173	343	240	Kuskokwim River	10	Reported	False	40	60												Diesel and Gasoline (12 tanks) 6050000, "Unknown" (Akakchik, Limited)	Fuels
Akakchik Water Plant Old Tank Farm	Tank Farm	Abandoned	0.01	1970s-2008	100+	42	23	1900	1950	450000	80	140	970	Kuskokwim River	10	BEA Calculated	False	40	60				True	Well 1	Groundwater	Unknown	300	Zone A			Fuels	
Akak AKARNG FSA	Polluted Soil	Active/Open	0.84	1980s-1990s	75	47	41	300	320	500000	1	65	300	Kuskokwim River	4	BEA Calculated	False	90					True		Groundwater	Unknown	170	Zone A	Diesel, 30000, "Heating Oil/Secondary Containment" (Army National Guard)	Fuels		
Akak Elementary School Former Tank Farm	Tank Farm	Active/Open	0.1	1980s-current	67	44	40	270	300	500000	20	45	270	Kuskokwim River	4	BEA Calculated	False	80					True		Groundwater	Unknown	170	Zone A	2 Diesel Tanks: 80000, "None" (Akak Native Community)	Fuels		
Akak High School Former Tank Farm	Tank Farm	Active/Open	0.12	1980s/2011	100+	44	33	555	650	500000	20	70	555	Kuskokwim River	4	BEA Calculated	False	80					True		Groundwater	Unknown	170	Zone A	7 Diesel Tanks: 940000, "None" (City or Corp)	Fuels		
Akak Kiamut Corporation Tank Farm	Tank Farm	Ended		1970s-1999	-1	-1	-1	0	1	500000	999	100	0	Kuskokwim River	4	BEA Calculated	False	80					True		Groundwater	Unknown	170	Zone B			Fuels	
Akak Landfill	Landfill	Active/Open	2.7	1980s-present	100+	62	35	2950	3000	500000	30	210	2700	Kuskokwim River	4	BEA Calculated	False	90					True		Groundwater	Unknown	211	Zone A			Burning, CDD/Asbestos, Municipal Waste	

## Site Rankings

- 716 total sites assessed
- 5 eroded during project timeframe
- 711 sites were scored
- 605 sites excluded likely to erode >50 years
- 106 sites left for final ranking
- 20 sites in upper 25% for both erosion & contaminant risk

WEAR Scores (51+ years to erosion not included)



# High Priority Sites

- Alakanuk Old BIA School
- Alakanuk South Side Dump Site
- Chevak Company Corporation Tank Farm
- Chevak Former AVEC Tank Farm
- Chevak Former City Tank Farm
- Chevak Old River Landfill
- Dillingham IHS Hospital Site
- Emmonak Landfill
- Golovin Fish Processing Plant
- Kalskag Consolidated Tank Farm
- Kotlik Landfill
- Kotlik LYSD Former Tank Farm
- Napakiak Corporation Tank Farm
- Napakiak School Tank Farm
- Nelson Lagoon Landfill
- Newtok Backhaul Staging Area
- Newtok UPC Generator Building
- Nunapitchuk Old Elementary School Tank Farm
- Oscarville School Tank Farm
- Shageluk City Tank Farm

# Dillingham IHS Hospital Site

- IHS Kanaknak Hospital, old hospital landfill, and multiple fuel-contaminated sites
- Multiple types of contaminants
- >50 acre site along Nushagak River
- Old landfill waste exposed by erosion
- Seeps & stressed vegetation noted
- Located within critical habitat area
- Silt & clay soils
- Erosion rate of 1ft/year
- Active erosion noted
- No erosion mitigation efforts



## Oscarville School Tank Farm

- Store 28,000 gallons heating fuel
- 120ft from school, 165ft from residences, 790ft from subsistence fishing area
- Drinking water protection zone for school's water supply
- Xylenes in drinking water
- Erosion rate of 3ft/year
- Silt riverbank



School Tank Farm (ADEC 2012)





**Tuntutuliak - Riverbank Erosion 2012**



**Nunam Iqua - Shoreline Erosion 2014**



**Alakanuk - Riverbank Erosion 2014**



**Wainwright - Shoreline Erosion and Riprap Installation 2013**

<http://dec.alaska.gov/eh/sw/wear.html>

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WASTE EROSION ASSESSMENT AND REVIEW (WEAR) PROJECT

**An Inventory Project**

Coastal and river erosion has the potential to cause hazardous substances and garbage from Alaska's landfills, contaminated sites, tank farms, and other sites of environmental concern to be released into the ocean and the state's rivers, jeopardizing Alaska's waters, fish and wildlife.

The Alaska Department of Environmental Conservation conducted a four-year \$1.4 million project to inventory and rank those sites, and generate detailed action plans for the sites of highest concern. This project will help state and federal agencies, as well as rural communities, allocate funding to cleanup sites and control eroding areas.

The Waste Erosion Assessment and Review (WEAR) project was funded by the federal Coastal Impact Assistance Program (CIAP), which dispersed money through federal legislation to six states that are on the outer continental shelf and produced oil and gas.

**Community Visits 2012 - 2014**



bing esri

Image courtesy of NASA

[View larger map](#)

Please note it may take a moment for the map to load.



The project area covered Alaska's northern and western coasts, the Aleutian Islands, and river communities up to 300 miles upriver from the coast. Staff conducted site visits in 124 out of the 144 communities to gather more information about sites within each community. They also performed a detailed evaluation of the design and operations of the landfill in each community.

Input from locals was important during the site visits to help identify sites that were of environmental concern or were eroding. They provided a history for the community that was extremely helpful.

Sites inspected included landfills (dumpsites), contaminated sites, tank farms, boneyards of worn-out vehicles and heavy equipment, and sites where historical military or mining activity occurred near a community. All these sites may be sources of hazardous chemicals, such as PCBs, chlorinated solvents, heavy metals, pesticides and petroleum products.

The WEAR Map displays all 716 sites inspected in the 124 communities. Information on each site can be found in the **SWIMS database**.

**Final Report**

DEC released its Final Report in May 2015. It includes the preliminary reports for each community visited, which provides a brief narrative of the community sites and photos of each site. It also contains the

