A Source Water Assessment (SWA) for

AK Gateway SD – Tanacross School, PWS ID # 380573.001

What is an SWA?

The Drinking Water Protection group of the Drinking Water Program is producing Source Water Assessments (SWAs) in compliance with the Safe Drinking Water Act (SDWA) Amendments of 1996. Each SWA includes:

- A delineation of the drinking water source area;
- Inventory of potential and existing sources of contamination;
- Risk ranking for the identified contaminants;
- Evaluation of the overall vulnerability to the PWS source.

What is a Protection Area?

The most probable area for contamination to reach the drinking water well is within the drinking water protection area (DWPA). The DWPA for a groundwater source is the area around the well (the area influenced by pumping) and also the area upgradient of the well, usually forming a parabola shape. Because releases of contaminants within the DWPA are most likely to impact the well, this area will serve as the focus for voluntary protection efforts.

The DWPAs established for wells by DEC are separated into 2 zones, limited by the watershed. The following is a summary of the two zones for wells and the estimated time-of-travel for each:

Zone	Definition
A	Several months time-of-travel
B	Less than the 2 year time-of-travel

Table 1: Public Water System Source Information

PWS Name	AK Gateway SD – Tanacross School
PWS ID Number	380573.001
State Asgn ID No.	WL001
Facility Name	WL AK Gateway SD – Tanacross Sch
Source Type	Groundwater
Federal Classification	Non-Transient, Non-Community Water System
Total Depth of Well (ft bls*)	60
Static Water Level (ft bls*)	17
Aquifer Type	Unconfined
Aquifer Formation	Gravel and Sand

*"ft bls" = feet below land surface

Executive Summary

The public water system for AK Gateway SD – Tanacross School is a Non-Transient, Non-Community (NTNC) Water System consisting of one well in Tanacross, Alaska. An assessment of the susceptibility of the wellhead and aquifer to contamination, and the vulnerability of the public water system to potential and existing contamination were evaluated as of August, 2011. The wellhead received a susceptibility rating of **Low** and the aquifer received a susceptibility rating of **Very High**. Combining these two ratings produces a **Medium** rating for the natural susceptibility of the well. Identified potential and existing sources of contamination for the AK Gateway SD – Tanacross School public drinking water system include a monitoring well, a baseball field, an airport and paved roads. These are considered potential sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals (VOCs), heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals (SOCs), and other organic chemicals (OOCs).

Combining the natural susceptibility of the well with the six (6) contaminant risk categories, the public water system for AK Gateway SD – Tanacross School received an overall vulnerability rating of **Low** for bacteria and viruses, nitrates and/or nitrites, heavy metals, cyanide, and other inorganic chemicals, SOCs and OOCs; and a **Medium** for VOCs.

Introduction

Source Water Assessments (SWAs) are intended to provide public water system operators, owners, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. AK Gateway SD – Tanacross School's SWA is a tool to be used as the foundation or "stepping stone" to comprehensive management and protection of its groundwater resource. Protecting the quality of your drinking water is a sensible investment.

Drinking Water Protection Area (DWPA)

For groundwater sources, a combination of a numerical flow model and natural factors such as drainage divides, subsurface barriers, and manmade structures are used to determine the size and shape of the DWPA. The orientation of the DWPA is typically drawn using a groundwater surface, or a land surface elevation map. Because of uncertainties and changing site conditions, a factor of safety is added in calculating the size of the protection areas. (See AK Gateway SD – Tanacross School's DWPA on Map 1 of the Appendices.)

Natural Susceptibility

Susceptibility of a groundwater source is a measure of a water supply's potential to become contaminated based on information gathered on the wellhead and the aquifer.

Natural Susceptibility (Wellhead and Aquifer)

The **susceptibility of a wellhead** to the introduction of contaminants to the drinking water is determined by, but not limited to, the following risk factors: presence of a sanitary seal, protection from flooding, and presence of adequate grouting.

The wellhead for AK Gateway SD – Tanacross School received a **Low** susceptibility rating. A DEC Drinking Water staff visit in October 7, 2010 indicates that the well is capped with a sanitary seal, the land surface is sloped away from the well, and the well is properly grouted. A sanitary seal prevents potential contaminants from entering the well while sloping of the land surface and grouting help to prevent potential contaminants from traveling down the outside of the well casing and into the aquifer.

The **susceptibility of an aquifer** to the introduction of contaminants is determined by, but not limited to, the following risk factors: whether the aquifer is confined or unconfined, whether the well is completed in unconsolidated or fractured bedrock, whether other wells and bore holes are penetrating the aquifer and, if applicable, the characteristics of the confining layer.

The aquifer that the AK Gateway SD – Tanacross School water system is in is unconfined and consists of layers of gravel and sand. It has received a **Very High** susceptibility rating because of the existence of a monitoring well within the protection area. The high water table in the area may also allow contaminants to travel downward from the surface with precipitation and surface water runoff.

The **Natural Susceptibility** of the well to contamination is **Medium**. Table 2 summarizes the susceptibility ratings for AK Gateway SD – Tanacross School source water.

Table 2: Susceptibility Ratings

	Rating
Susceptibility of the wellhead	**Low**
+	
Susceptibility of the Aquifer	**Very High**
=	
Natural Susceptibility	**Medium**

Inventory of Potential and Existing Sources Contamination

The Drinking Water Protection (DWP) group has completed an inventory of potential and existing sources of contamination within the DWPA for the AK Gateway SD – Tanacross School well. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water aquifer include a wide range of categories and types. Potential drinking water contaminants are found within agricultural, residential, commercial, and industrial areas, but can also occur within areas that have little or no development.

The identified potential sources of contamination are summarized in Table 3 and are portrayed in Map 2 of the Appendices.

Table 3: Contaminant Source Inventory

Contaminant Source Type	*Contaminant Source ID*	*Zone*	*Map Number*	*Comments*
Monitoring wells	W06	A	2	North East side of school building
Municipal or city parks (with green areas)	X04	A	2	Tanacross School Baseball Field (with/without turf?)
Highways and roads, paved (cement or asphalt)	X20	A	2	New Tanacross Rd
Airports	X14	B	2	Tanacross Airfield
Highways and roads, paved (cement or asphalt)	X20	B	2	Tanacross Airport Rd

Contaminant Risks

Inventoried contaminant sources are sorted by the Drinking Water Protection (DWP) group according to the six (6) major categories of contaminants regulated for drinking water: 1) bacteria and viruses; 2) nitrates and/or nitrites; 3) volatile organic chemicals (VOCs); 4) heavy metals, cyanide, and other inorganic chemicals; 5) synthetic organic chemicals (SOCs); and 6) other organic chemicals (OOCs). The potential contaminant sources are then given a ranking (within each category) according to the degree of risk posed to human health based on the volume, toxicity, persistence, and the mobility of the contaminants involved.

Table 4: Contaminant Risk Rankings

Contaminant Source Type	Contaminant Source ID	Zone	Risk Ranking					
			Bacteria & Viruses	Nitrates / Nitrites	VOCs	Inorganic Chemicals*	SOCs	OOCs
Monitoring wells	W06	A	Low	Low	Low	Low	Low	Low
Municipal or city parks (with green areas)	X04	A	Medium	Medium	None	Low	Low	None
Highways and roads, paved (cement or asphalt)	X20	A	Low	Low	Low	Low	None	Low
Airports	X14	B	None	Low	High	Low	Medium	Medium
Highways and roads, paved (cement or asphalt)	X20	B	Low	Low	Low	Low	None	Low
Overall Risk Ranking			**Low**	**Low**	**Medium**	**Low**	**Low**	**Low**

** Includes Heavy Metals, Cyanide and Other Inorganic Chemicals*

The contaminant risk ranking for Bacteria and Viruses and Nitrates and/or Nitrites is **Low**. The risk ranking is primarily attributed to a baseball park located within the DWPA. The risk was downgraded since turf care for the baseball field does not involve the use of fertilizers. No bacteria/viruses have been detected in source water and only small concentrations of nitrates/nitrites have been detected.

The contaminant risk ranking for Volatile Organic Chemicals is **Medium**. The risk ranking is primarily attributed to the airport located within the DWPA. The risk was downgraded since the airport is very seldom used. Para-dichlorobenzene and toluene have been detected in source water in small concentrations.

The contaminant risk ranking for Heavy Metals, Cyanide and Other Inorganic Chemicals is **Low**. The risk ranking is primarily attributed to the monitoring well, baseball park, paved roads, airport and the detection of arsenic at 12.5% of the allowable limit (MCL) for arsenic. The risk was downgraded since turf care for the baseball field does not involve the use of fertilizers and the airport is very seldom used.

The contaminant risk for Synthetic Organic Chemicals and Other Organic Chemicals is **Low**. The risk ranking is primarily attributed to the airport. The risk was downgraded since the airport is very seldom used. SOCs and OOCs were not detected in the source water.

Overall Vulnerability of the Drinking Water Source to Contamination

An overall vulnerability is determined for each water system by combining each of the contaminant risk scores with the natural susceptibility score:

Overall Vulnerability of the Drinking Water Source to Contamination = Natural Susceptibility + Contaminant Risks

Table 5 summarizes the overall vulnerability ratings for each of the six (6) categories of drinking water contaminants.

Table 5: Overall Vulnerability

Category	Rating
Bacteria and Viruses	**Low**
Nitrates and/or Nitrites	**Low**
Volatile Organic Chemicals	**Medium**
Heavy Metals, Cyanide, and Other Inorganic Chemicals	**Low**
Synthetic Organic Chemicals	**Low**
Other Organic Chemicals	**Low**

Using the Source Water Assessment

This assessment of contaminant risks and source vulnerability can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of AK Gateway SD - Tanacross School to protect public health. Communities can use the Source Water Assessment (SWA) to create a *drinking water protection plan* to manage the identified potential and existing sources of regulated drinking water contaminants and to prevent or minimize new contaminant threats in the drinking water protection area.

AK Gateway SD - Tanacross School can use a number of different drinking water protection methods to limit or prevent contamination of its drinking water source.

- Non-Regulatory Options include:
    - Public education about where drinking water comes from and the effects of contaminants is probably the most effective and least costly method of protection;
    - Household hazardous waste collection - household hazardous wastes are usually generated in small amounts but can have a big impact on the environment;
    - The source water assessment report is a tool that can be used to prioritize protection strategies identified in a drinking water protection plan;
    - Taking proactive measures towards proper waste storage and disposal can help eliminate the need to find an alternative drinking water source by preventing source water contamination;
    - Conservation easements - easements can assist in protecting the area by limiting development;
    - Make a written plan on what you will do if an accidental spill happens that could contaminate your source of drinking water; and
    - Local drinking water protection plan (an example or template is available from DEC).

- Regulatory Options include:
    - Source protection regulations prohibiting the presence or use of all or specific chemicals within the drinking water protection area;
    - Zoning ordinances to control development within the protection areas around the source;
    - Subdivision ordinance; and
    - Operating standards for industrial and other activities within the protection areas around the source.

Source Water Assessments can be updated to reflect any changes in the vulnerability and/or susceptibility of the AK Gateway SD - Tanacross School drinking water source. The data that is used to generate the Source Water Assessment is updated on an on-going basis as identified in the field or if changes are identified and brought to the attention of the Drinking Water Program.

Where to go from here?

The Source Water Assessment (SWA) is a comprehensive evaluation of the potential risk of contamination to the public water system and the source(s) of drinking water used by the system. Identifying potential sources of contamination and the vulnerability of the public water system is an important first step in protecting the drinking water source from contamination. However, in order to prevent contamination from occurring, action must be taken by the water system owner and/or operator. The SWA can be used by the public water system to educate the local community and to prioritize community-driven protection strategies. Inviting community members, council members, and local government officials to help develop a Drinking Water Protection Plan is one essential component towards successful drinking water protection efforts. For questions regarding, or assistance to begin, the process of developing a Drinking Water Protection Plan, please contact the Drinking Water Protection group at #1-866-956-7656.

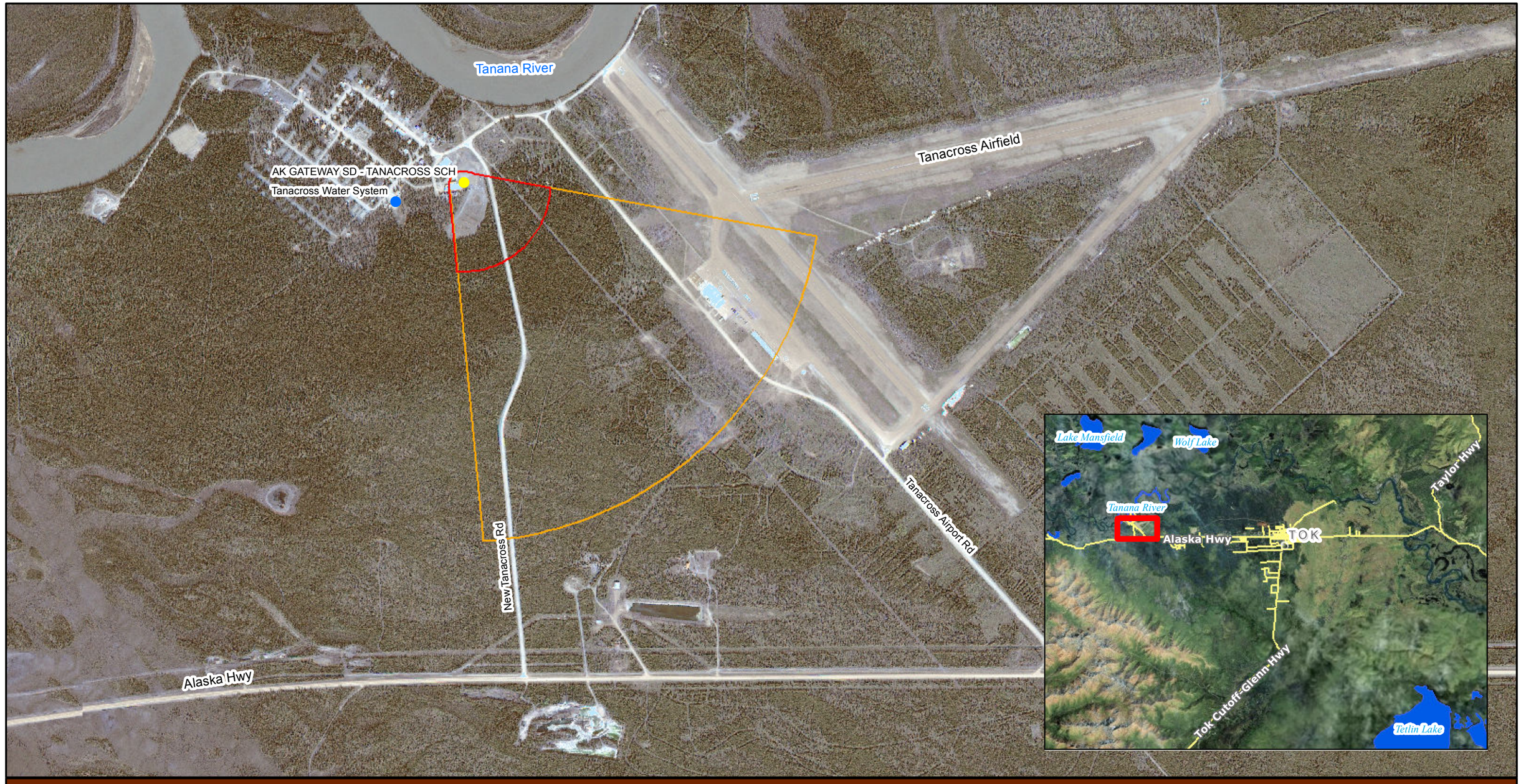
Other Resources

The Drinking Water Protection group, the EPA, and local organizations are available to help you build on this Source Water Assessment report as you continue to improve drinking water protection in your community.

DEC, Drinking Water Protection - http://dec.alaska.gov/eh/dw/DWP/source_water.html
EPA, Drinking Water Protection - http://cfpub.epa.gov/safewater/sourcewater/index.cfm
Groundwater Foundation - http://www.groundwater.org
ARWA (Alaska Rural Water Association) - http://www.arwa.org
Groundwater Protection Council- http://www.gwpc.org
National Ground Water Association: http://ngwa.org/

Appendices

- AK Gateway SD - Tanacross School Drinking Water Protection Area Location Map (Map 1)
- AK Gateway SD - Tanacross School Drinking Water Protection Area with Potential and Existing Contaminant Sources (Map 2)



Map 1 - AK Gateway SD - Tanacross School

PWS ID# 380573.001

Alaska Department of Environmental Conservation

1:12,000

Inset: 1:454,500

0 0.125 0.25 0.5 0.75 1 Miles

Public Drinking Water System Sources

- Community water system (CWS) source (formerly: Class A)
- Non-transient, non-community (NTNC) water system source (formerly: Class A).

Drinking Water Protection Areas

- Zone A: Several-month time-of-travel for groundwater sources
- Zone B: Two-year time-of-travel for groundwater sources

N W E S

Data Sources:

Aerial Imagery: A WMS-compliant map server provided by the Alaska Mapped program and UAF-GINA
Public Drinking Water Sources: ADEC
Drinking Water Protection Areas: ADEC

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Sources of Contamination (Zone A);
- 1 Monitoring Well, W06
- 1 Park, X04
- 1 Road, X20

Sources of Contamination (Zone B):
- 1 Airport/Airstrip, X14
- 1 Road, X20

X04
T16
T16
W06
R01
R01
R01
X14
Tanacross Airfield
X14
Tanacross Airport Rd
W06
W06
W06
New Tanacross Rd

School Access Rd
New Tanacross Rd
R01
W06
T16
T16
Tanacross School Well
380573.001

Map 2 - AK Gateway SD - Tanacross School

PWS ID# 380573.001

Alaska Department of Environmental Conservation

0 0.05 0.1 0.2 Miles

N W E S

1:6,600
Inset: 1:2,400

Public Drinking Water System Sources

Non-transient, non-community (NTNC) water system source (formerly: Class A).

Drinking Water Protection Areas

Zone A: Several-month time-of-travel for groundwater sources

Zone B: Two-year time-of-travel for groundwater sources

Potential Sources of Contamination

X14, Airports

W06, Monitoring wells

R01, Residential Areas

T16, Tanks, heating oil, nonresidential (underground)

X14, Airports/Airstrips

X04, Municipal or city parks (with green areas)

Data Sources:

Aerial Imagery: A WMS-compliant map server provided by the Alaska Mapped program and UAF-GINA
Public Drinking Water Sources: ADEC
Drinking Water Protection Areas: ADEC
Potential/Exisiting Sources of Contamination: ADEC

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