

NAME

DATE



HEARST*foundations*

PRIMARY SOURCES FROM ALASKA'S 1964 & 2018 EARTHQUAKES

Earthquakes are geologic events that cause the land to shake and roll. Small earthquakes occur around the world every day and are often only detectable by sensitive instruments. Large earthquakes are rarer, but leave enduring marks upon the land and the memory of people who experience them. In 1964, the second largest scientifically recorded earthquake shook the ground under Southcentral Alaska. This earthquake caused death and destruction that changed the history of Alaska and earthquake science throughout the world.

In 2018, another large earthquake struck the same region. Although it was far less powerful than 1964 and had no human casualties, it nevertheless served as a reminder of the power of earthquakes in Alaska. Examining the geologic and social records of earthquakes can help us understand and prepare for future tremors.

HOW TO EXPLORE:

Slow down and look closely. Each object has a story to tell.

Ask questions. Be curious about details.

Make this journal yours. Use the pages to draw, write, and note in your own way.

Share. Tell a friend, a family member, or mentor about your experience.

EMERGENCY PREPAREDNESS

What do you do to prepare for earthquakes and other emergencies?

Based on what you have learned from the 1964 letters and the 2018 earthquake experiences, what would you do to prepare for future earthquakes?

What do you consider to be trustworthy sources of information during earthquakes and other crises? What makes those sources trustworthy?

EARTHQUAKE SCIENCE

Southcentral Alaska experiences many earthquakes due to its location near a large, active subduction zone. In this subduction zone, the Pacific plate travelling in a northwest direction runs into and slides beneath the North American plate.

As tectonic plates slowly grind against each other, friction builds between slow moving blocks of rock near the boundary. An earthquake occurs when these blocks of rock slip suddenly along a fault. This slip releases energy in the form of seismic waves, which travel as vibrations through the earth.

Scientists describe the magnitude, or size, of an earthquake using the Moment Magnitude Scale (denoted M_w or M). The Moment Magnitude Scale relates the amount of energy released by an earthquake to a number from 1 to 10. This scale combines the wave data from seismographs with physical information about the land. The difference between a single unit on the Moment Magnitude Scale represents multiplying the energy released during an earthquake by 32. An $M_{7.0}$ earthquake releases 32 times more energy than an $M_{6.0}$ earthquake.

Fault

a fracture or break that allows for movement between blocks of rock

Seismograph

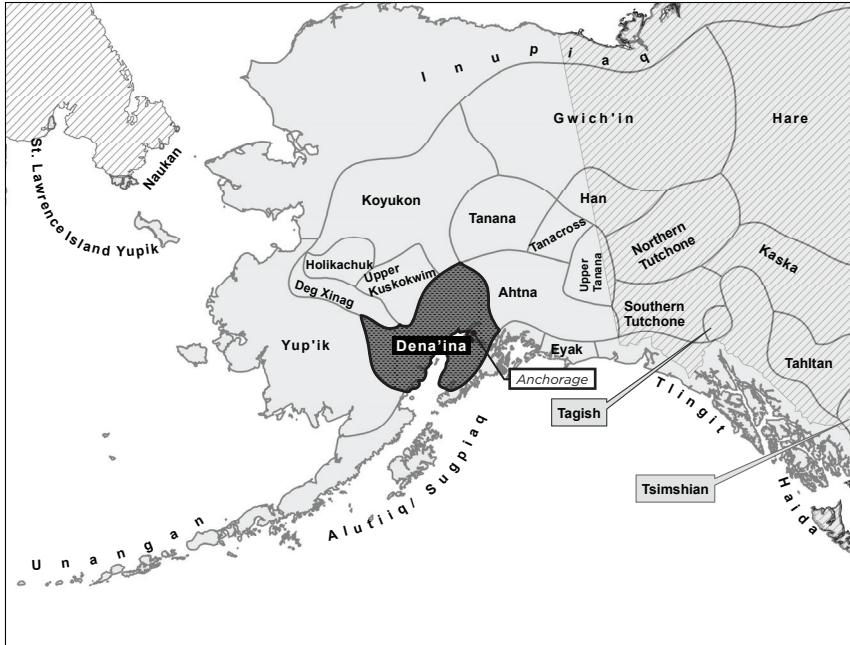
an instrument used to detect and record the wave motion of earthquakes and other ground movements

Aftershock

a smaller earthquake which occurs in the same general area as the main seismic event; aftershocks indicate minor readjustments of the land around the fault that slipped

EKLUTNA DENA'INA* LAND

Anchorage is located on the traditional homelands of the Eklutna Dena'ina people.*



Krauss, Michael, Gary Holton, Jim Kerr, and Colin T. West. 2011. *Indigenous Peoples and Languages of Alaska. Fairbanks and Anchorage: Alaska Native Language Center and UAA Institute of Social and Economic Research.* Online: <http://www.ua.edu/anla/map>

Etnen ghenu *Dena'ina* term for 'there is an earthquake'*

Nuna aulaluni *Alutiiq (Sugpiaq) term for there is an earthquake'*

Nuna pektuq *Yup'ik term for 'there is an earthquake'*

** A language that is part of the largest Indigenous language family in North America, Dene. The Dene language family, which is commonly identified as 'Athabaskan,' is not a word native to any of the Indigenous languages to which it refers.*

FUTURE EARTHQUAKES

Citizen science *the collection and analysis of data from the natural world by the general public often as a collaboration with professional scientists*

USGS *the United States Geologic Survey, a nonpartisan natural science research branch of the US government, which is responsible for several earthquake monitoring programs*

Emergency preparedness *the knowledge of and readiness for the hazards found in a particular community; includes the creation of response plans and the assembly of basic survival supplies for a disaster and its aftermath*

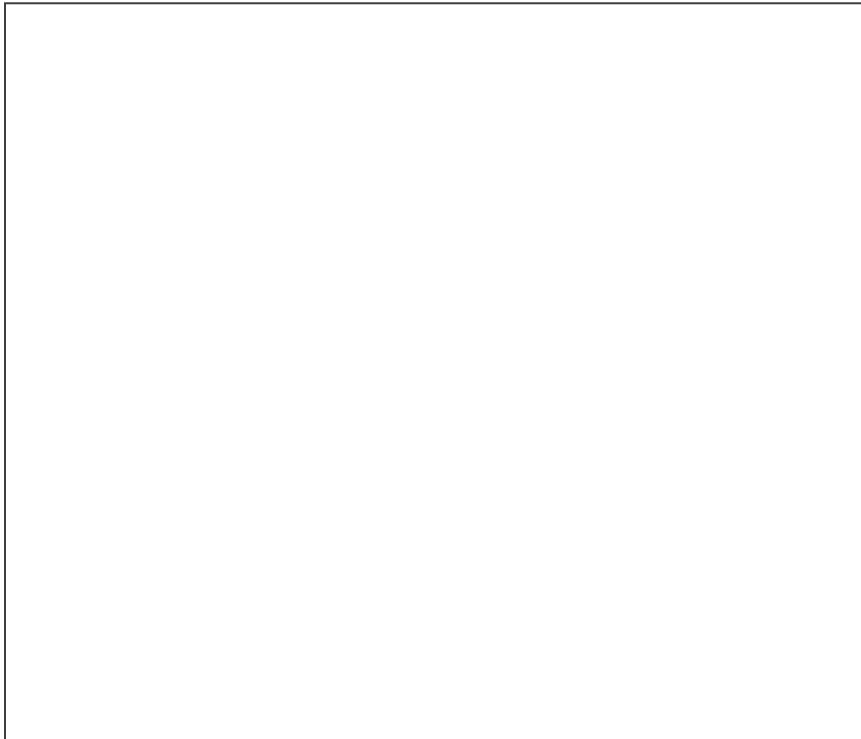
DID YOU FEEL IT? (DYFI)

The USGS runs a webpage called Did You Feel It? (DYFI) to help collect earthquake intensity data. Any citizen can contribute a DYFI report even if they did not feel the earthquake. The report combined with the contributors' geographic information helps the USGS understand how earthquakes are felt (or not felt) across geographic areas. Some example questions from this survey include:

- How would you describe the shaking?
- How did you react?
- How did you respond?
- Did you hear creaking or other noises?
- Did pictures on walls move or get knocked askew?
- Was there any damage to the building?

*Why do you think USGS chose these questions?
How might scientists use this information?*

Create a meme inspired by an earthquake experience or based on the interview notes from earlier. Sketch the image and write an accompanying text.



EKLUTNA DENA'INA* LAND

Adgilax *Unangax[^]* term for earthquake*

Tanax[^] yaagikux[^] *Unangax[^] term for 'the ground is quaking, there is an earthquake'*

Ull'ute *Yup'ik term for 'collapse on the people in the building during an earthquake'*

Qupneq *Yup'ik term for fissure*

** Unangax[^] is the name of the Indigenous peoples of the Aleutian Islands. The name 'Aleut' comes from Russian colonizers in the 18th century*

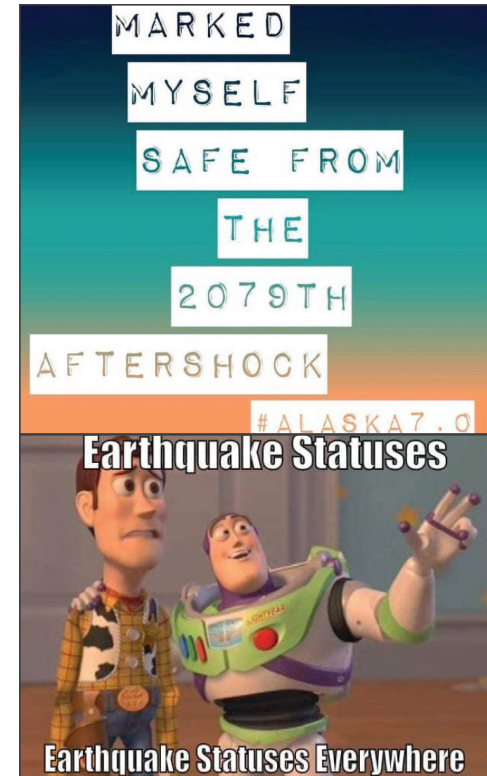
EARTHQUAKE SCIENCE

The magnitude of an earthquake cannot fully describe how that earthquake will be felt. The intensity of shaking experienced or the dangers resulting from an earthquake depend on a variety of factors. These factors may include the magnitude of the earthquake, the depth of the earthquake, the length of shaking, the distance from the epicenter, and the makeup of the underlying rocks and soil. Local geology and the engineering of nearby structures may create other dangers such as tsunamis, liquefaction, and building collapse.

Epicenter *a point on the surface of the Earth directly above an earthquake's origin point*

Liquefaction *a phenomenon common in areas of loose soil in which stress and vibrations, such as those caused by earthquakes, turn seemingly solid ground into flowing ooze*

Tsunami *a wave or series of waves generated when a disturbance such as a landslide, earthquake, or volcanic eruption displaces a large volume of water*



What conclusions about the earthquake can we draw from these two memes?

How might memes or social media in general be helpful or harmful to communication in the aftermath of an earthquake?



Sketch of Clock, mid-20th century, plastic, metal, gift of the United States Postal Service, 1964.2.1

This clock was recovered from the sorting room of the Anchorage Post Office during the March 27, 1964 earthquake. The hands show the time that it stopped—5:37 p.m.

1964 GREAT ALASKA EARTHQUAKE

The 'Great Alaska Earthquake' began on Good Friday, March 27, 1964 at 5:36 p.m. At M9.2, it is the second largest earthquake ever recorded with scientific instruments. The earthquake's epicenter was 120 km (75 miles) east of Anchorage and it occurred at a depth of 25 km (15.5 miles). The shaking triggered tsunamis, landslides, and liquefaction, all of which caused extensive damage across Southcentral Alaska. The earthquake caused 131 fatalities, the vast majority of which resulted from tsunamis.

In 1964, the movement of plate tectonics was still an emerging theory and the underlying causes of most earthquakes were unknown. The aftershock measurements and landscape observations collected by United States Geologic Survey scientists in the weeks after the earthquake pointed to the thrust of a subducting tectonic plate as the cause of the Great Alaska Earthquake. This body of evidence validated the theory of plate tectonics as the best explanation for observed real-world phenomena.

The 1964 quake occurred at a pivotal moment in Alaska's growth as a state. Damage revealed infrastructure vulnerabilities which encouraged more thoughtful considerations for future development. The traumatic 1964 earthquake experiences of communities created a strong, lasting collective memory of the importance of earthquake monitoring and emergency preparedness.

SOCIAL MEDIA RESPONSES TO THE 2018 EARTHQUAKE

Meme

an idea, style, or behavior that spreads from person to person in a culture. In the 21st century, a meme often refers to an internet meme—which is often represented as an image, video, or text and shared rapidly through the internet

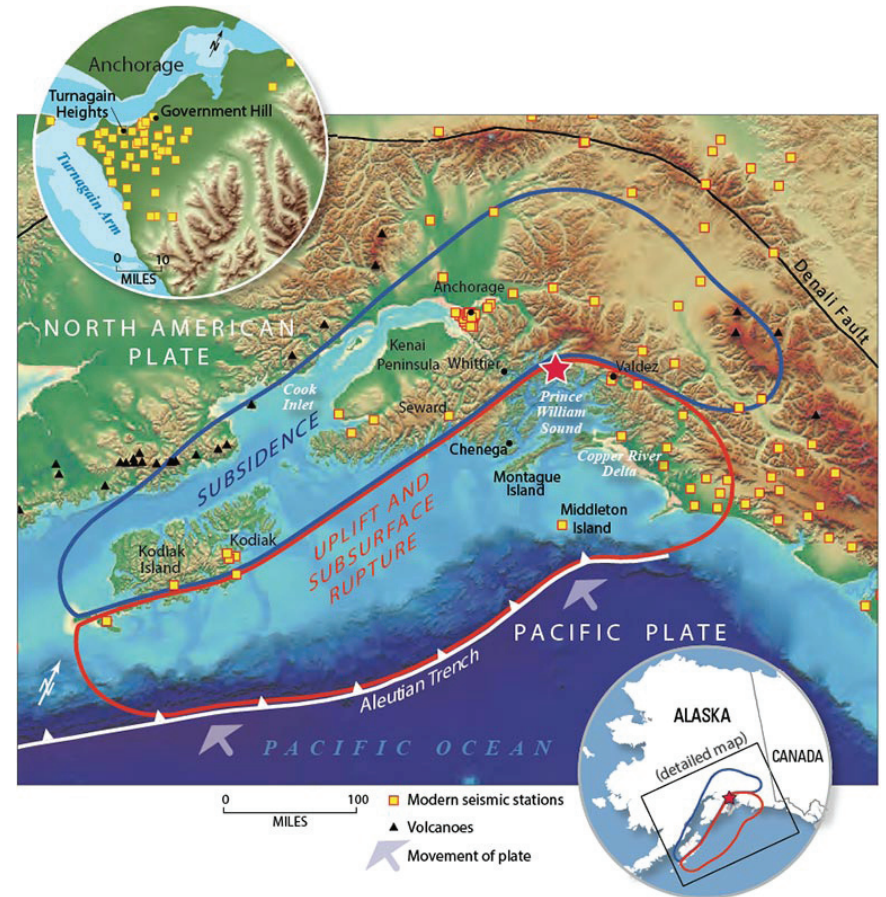
Write down your definition of meme or draw a meme you like or have encountered.

Reflect on the November 2018 Anchorage earthquake or interview someone who experienced the earthquake.

Ask questions like the following and write down answers:

- What happened?
- Where were you/they?
- Who were you/they with?
- What were you/they doing during the earthquake?
- What did you/they do after the earthquake?
- How did you/they feel?
- What damage did you/they see?
- What was it like the day after the earthquake?

Write your own poem about the earthquake experience.
Utilize your notes from questions above as inspiration.



Map of Southern Alaska Showing the Epicenter of the 1964 Great Alaska Earthquake (Red Star),USGS.

“Never before were so many effects on earth processes and on the works of man available for study by scientists and engineers over so great an area.”
- USGS¹

¹ Professional Paper 546: “The Alaska Earthquake March 27, 1964: Lessons and Conclusions”

PRIMARY SOURCES

Primary Source

A first-hand, original account, record, or evidence about a person, place, object, or an event.

List examples of primary sources.

Where do you find primary sources?

How do you use primary sources?

Secondary Source

An account, record, or evidence obtained from an original or primary source.

List examples of secondary sources.

Where do you find secondary sources?

How do you use secondary sources?

MOTHER EARTH BREATHES

The morning was normal.
I was sighing, the cat
was snoring, the snow
was sleeping. The breath
of the day was morning-light.
breathing is never silent,
yet, its quietness tricks
me into the elephants, the seals,
the salmon. Mother Earth
breathes and my body
recalls the shift
of ancient ground
that birthed us, when
Earth broke us into being,
into a billion linked
fragments, our breath
our bond

--Joanna Lilley

*Which poetic devices (enjambment, personification, etc.)
does the poet use, and what meanings does it create for the poem?*

**HIGHWAY
(FOR KRISTEN)**

What is a highway
but a spine - verterba
of Subaru, Toyotas, Dodge
trucks - each filled with bones
that touch steering wheels,
each a slight curvature of
earth, hope, time paused
with a collective breath:
collective groan of the body:
collective melting of ice in fear
as vehicles, (bones) bend under
the weight of unseen breaking.
What is a highway but a spine,
but proof of this planet, our
connection to one another: so many frightened pieces
of a whole?

--Tara Ballard

*What do you notice about the title, form, and shape of the poem?
How does this poem relate to earthquakes?*

DOCUMENTATION AND OBSERVATION

"Every large earthquake, wherever located, should be regarded as a full-scale laboratory experiment whose study can give scientific and engineering information unobtainable from any other source."²

Anyone who experiences an event can create a primary source.
*What are ways you create primary sources?
What are some examples of primary sources you have made?*

² USGS Professional Paper 546 "The Alaska Earthquake March 27, 1964: Lessons and Conclusions"

Primary Source #1

Bill and Ellyn Frye letter regarding the 1964 Alaska Earthquake; Anchorage Museum, B2013.011

Bill's experience had been much more dramatic than mine. He had been downtown at Alaska Sales and Service, a General Motors dealer. He was writing an estimate in the basement of the building when the quake started. He and the rest of the employees rushed out and down half a block to a parking lot and thus away from falling debris. He said that fissures were opening and closing all around him and that the streets and sidewalks were rolling up and down making running extremely difficult. He watched the 15-story Westward Hotel sway back and forth crazily in the air and bang again and again into the building next to it. He said he would have sworn that it wouldn't stand. It has since been designated as the tallest structure in the world to withstand such a violent earthquake. As the quake progressed and above the general din came a crackling and a crashing and suddenly he saw the cold storage building completely collapse. He looked toward Fourth Avenue, Alaska Sales is on Third Avenue, and two blocks of stores slowly fell and broke up so that now that area is so low that if you walk past the stores you can step in the second story windows. The Denali Theater marquee now touches the ground. There was a constant sound of breaking glass. Where he stood the ground began to sink and a fissure broke open under his foot--he ran quickly toward higher ground and then suddenly all was still. The Alaska Sales building appeared to be undamaged but he didn't go back for his coat but ran to his car and started home to see how I had survived. He passed an apartment building that was a total loss, drove over a pile of bricks in the street, and about six blocks from home was stopped by the crevasse that crossed L Street, an opening about 100 feet wide and 30 feet deep. He turned around and found another way home. Coming by the L Street Apartments, a fourteen-story structure and just two blocks from our house, he saw that the building had been cracked and shattered from top to bottom. It is a poured reinforced concrete building which did not withstand the pressure of the quake. This building cost several million dollars and has since been evacuated and condemned. Needless to say, we were both extremely grateful to find each other safe and well!

This is an excerpt from a letter written by Bill and Ellyn Frye to "mother," dated April 3, 1964.

What information from this primary source might a scientist or engineer find valuable? Why?

Primary Source #4: Poetry on Demand

On December 7, 2018, the Anchorage Museum hosted Unbound: Poetry on Demand, where ten Alaska-based poets provided a poem, inspired by a word or phrase they received from museum participants, in real-time. Copies of poems were collected and compiled by the Anchorage Museum to be preserved in the archives.

TREPIDATION

Yaa kanagwátl yá Lingitaaní
this world is spinning.
Think about a stopping point,
or even a pause, when
the oscillation might give way
to still ness.

I close my eyes and count
between the tremors,
hesitate to let out a breath
in hopes that my motion is linked.

The limbs of the trees hold no snow,
And the days reach their ends
As we tremble yet again.

--X'unei Lance Twitchell

What imagery does the poet use?

2018 ANCHORAGE EARTHQUAKE

An M7.1 earthquake shook Southcentral Alaska on November 30, 2018 at 8:29 a.m. AKST. The earthquake occurred 11 km (7 miles) north of Anchorage at a depth of about 43 km (27 miles). Within 18 days of the earthquake, nearly 5,000 aftershocks in the Southcentral area had been registered by seismic sensors.

This earthquake caused structural damage to some roads and buildings, but there were no fatalities. The 1964 earthquake was far more destructive because it released more than a thousand times more energy and shook the region for far longer than the 2018 earthquake. While the 1964 earthquake was the result of major tectonic plate interactions, the 2018 earthquake was caused by the tearing of a much smaller section within the Pacific Plate. However, the 2018 earthquake is classified as 'major' by seismologists and earthquakes of similar magnitudes have caused massive devastation in other parts of the world. Lessons learned from the 1964 quake and the adoption of strict building codes prevented more widespread destruction.

What are examples of primary sources from this event?

Primary Source #2

Colleen Ryan Collection; Anchorage Museum, B2016.003

It seemed like an eternity; but the quake finally subsided. Groans were heard as people in the neighborhood went back into their apartments to view the damage. To be quite honest, I didn't clean my apartment up completely until about a week later. You can't effectively clean without water, lights, and heat. Well, anyway, when I went back in I was hungry--my pork chop was lying in the now-open broiler, just barely browned on one side. So I had cheese and french bread for dinner--very poor substitute for butterfly pork chops. That's the thing that bothered me most about the earthquake--I didn't get to eat normally; I gained about six pounds because we had to eat so much bread and drink so much carbonated beverage type stuff. Ugh! I'll really be glad when our tap water is fit to drink; I hate the taste of boiled water so haven't been drinking any.

Well, that's my earthquake story--very uneventful and dull--for which I am most thankful. Met lots of nice people during this time, for which I am also thankful. The rest you know from the papers, some of which have been more than slightly inaccurate in their accounts of lives lost and other aspects. For me everything is normal again. For many unfortunate others, things won't be normal for years. I pray most hopefully that Alaska will be able to get back on her feet before too long. You can't imagine how proud I am to be in Alaska, to have been born here, and to know that this is where I want to spend the rest of my life. Well, enough of the sentiment. Thanks for listening. Bye for now.

*Love always
Colleen*

These are two excerpts from a letter written by Colleen Ryan to "grandma," dated April 15, 1964.

*What details about the earthquake and its aftermath stand out to you?
Why do you think Colleen chose to include those details in her letter?*

Primary Source #3

Andrea Ramsey 1964 Earthquake Collection;
Anchorage Museum, B2017.003

He came home as soon as he could.
We got a few bumps & bruises but
nothing serious. Everything is a
mess. The worst damage to Anchorage
was in the center of town.

We have to have typhoid shots
since the sewer pipes busted. We
still don't have heat, ~~but what we~~
~~still don't have~~ Our electricity
just came back on last night.

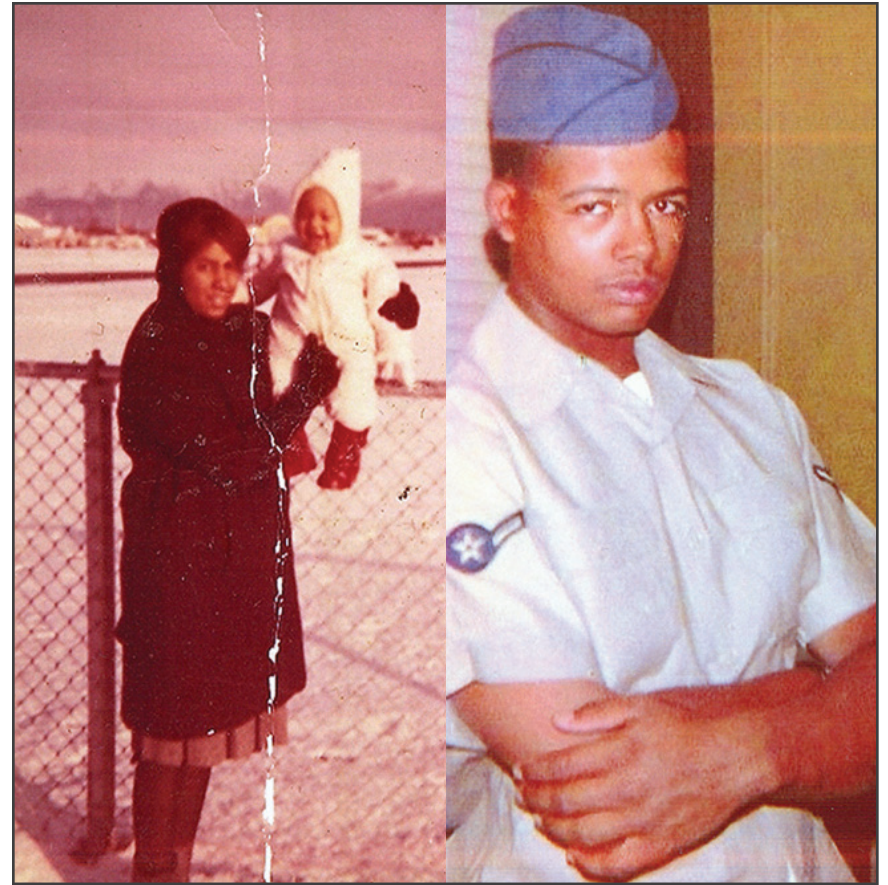
I hope you can read this I'm
still nervous.

Tracy was calm as could be
& wasn't affected much at all.

This is an excerpt from a letter written by Andrea Ramsey to "Monomie," dated March 29, 1964.

Note: Typhoid fever is a bacterial infection associated with the contamination of food or drinking water by sewage.

What can this primary source teach us about earthquake preparation
and response?



[left] Andrea Ramsey 1964 Earthquake Collection; Anchorage Museum, B2017.003.1

[right] Andrea Ramsey 1964 Earthquake Collection; Anchorage Museum, B2017.003.2

The two photographs above were included in the letter by Andrea Ramsey when it was collected by the Anchorage Museum in 2017. Noting the toddler in photo 1 and the military uniform in photo 2, what specific concerns might the Ramseys have had during and after the earthquake? Are any of these concerns reflected in the letter?
