IR-104-02

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SUMMARY REPORT OF INVESTIGATIONS IN THE NUKA BAY DISTRICT, KENAI PRECINCT, July 18 to 28, 1941

By

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July 18. Arrive Nukalaska Mining Company 3.30 a.m.

The operations of the Nukalaska Mining Company have been confined to development work in the east workings since the fire which completely destroyed the milling plant in June, 1938. These new east workings consist of a new adit tunnel driven on the east side of the high mountain ridge in which the showings and old workings are confined due south of camp. They are at an elevation of 1300 feet and extend nearly vertically under the old upper workings, elevation 2280 feet, on the west side of the ridge near the top. The purpose of this new adit tunnel is to tap the ore bodies below the old workings and to provide a more stable and secure tram site. This would eliminate the necessity of maintaining a road up the valley, one-half mile above camp, which is destroyed yearly by snowslides and limits the milling season to three months annually. The old double tramway from the old workings was inadequate, as nearly every year the towers were removed by snowslides.

Old West Workings:

The upper, or west workings, are located between elevations of 2280 and 2450 feet, the latter being the top of the steep mountain ridge, which extends northeasterly out from the main range to the southwest. The adit tunnel, elevation 2280 feet, is a cross-cut following the strike of the argillite or banded slate formation to a soda lime feldspar dike*, a distance of 180 feet. This dike has a strike of N. 82° W. and a steep dip 80°-85° S. A drift from the cross-cut leads in an opposite direction, following the strike of the dike to the west a distance of 200 feet, and to the east, including two short cross-cuts across the dike, a distance of 490 feet. A winze 63 feet in depth was sunk on the vein along the footwall of the dike at a point 80 feet west of the adit cross-cut. The last milling ore was mined from this winze which dips with the dike and ore 85° S. At a point 55 feet past the winze the dike and ore are cut off by a fault and displaced a distance of 30 feet. Good ore was reported in the bottom of the winze and the sides of the under-hand stope. At the fault the drift turns and follows the fault for a distance of 55 feet to the northeast, thence ends with a turn 10 feet into slate at a point 25 feet past the hanging wall displaced section of the dike. The fault strikes N. 27° E. and has a dip

*Capps, S. R., U. S. Geol. Sur. Bull. 897, pp. 28-29.

70° W., and is hereafter referred to as the west fault. The dike in the hanging wall or west section shows no quartz or ore on the walls of the dike, but this may be due to the pinched condition near the fault. Ore was reported, however, in the hanging wall section of this fault on the surface, nearly 200 feet above. The extent of this ore is not known nor could it be seen due to the inaccessibility of this point on the surface during the summer period when the snow melts away from the bluffs. However, this ore could be easily reached from the stopes above by drifting to the west. From this west fault east to the adit cross-cut, a continuous lense of ore was stoped to a height of 155 feet. Its length is 120 feet and it averages 12 inches in width. On the surface this ore shoot was 47 feet in length. The greater portion of the ore appears to be still intact below the tunnel level, and its depth is unknown. This ore body is on the footwall of the dike. At the intersection of the adit and the dike a 12-inch quartz vein occurs on the hanging wall. It has not been developed and shows again in the drift 60 feet east of the intersection as the drift crosses the dike. Here the vein is 12 inches in width and was reported to contain minable values.

The No. 2 or central ore body is located on the footwall of the dike and extends from the adit intersection east for a distance of 65 feet. Its average width is 12 inches and was 35 feet long at its outcrop 150 feet above. It was reported that one block of ore still remains near the surface which contains 200 tons of $100 per ton ore.

At a point 220 feet east of the adit intersection in the east drift, No. 3 ore body occurs on the hang-wall of the dike. This shoot has a length of 62 feet and has been stoped up 50 feet, at which point it has a length of 27 feet. The ore shoot averaged 10 inches in width. Some high grade ore still remains above the level of the drift and neither No. 2 nor No. 3 shoot has been mined below the drift level.

A fault known as East Fault was encountered at a point 380 feet past the adit intersection. This fault strikes N. 27° E., parallel to West Fault, and dips 74° W. Both dike and ore have been cut off by this fault and an additional 35 feet of drift to the SE. failed to pick up their continuation. This fault shows plainly on the surface 70 feet above, elevation 2350 feet, and shows the dike to be displaced 35-40 feet to the north on the footwall continuation. This point on the surface marks the crossing of the dike over the ridge and the dike to the east continues down the east slope and enters a box canyon, too steep to follow for observation on the surface. At the bottom of this canyon, 300 feet below, some quartz with values was found on the walls of the dike.

The entire west workings are situated in what is termed the upper slate band of the alternating slate and graywacke formation. The apparent displacement of the dike by the NE. striking faults in the slate band accounts for the fractured condition of the dike, which is in part recemented with quartz containing sulphides and spotty gold values. The apparent pressure points between the faulted dike segments

account for the openings along the walls of the dike in which the gold-bearing lenses or shoots were formed. The tenor of the ore mined from these shoots was exceedingly high in value. The total production of past milling from these three shoots, mainly above the drift level, amounted to $125,000.

The faulted block between the east and west fault forms the highest portion of the spur ridge. The east fault is plainly visible on the northwest slope of this mountain and down the slope for a distance of 1,000 feet vertically. (Note Slide No.).

New East Workings:

Four days were spent in mapping the west workings and the new east tunnel workings and tying them together in order to locate the present face of the east workings with relation to the old west workings. Inaccessibility prevented measuring the distance in the past by tape and necessitated the use of visible elevation points and estimating by using slope angles.

The east tunnel direction and horizontal distance to a point vertically under the east end of the old workings was estimated by an engineer formerly with the company. The direction of the east tunnel was reasonably correct, however, the horizontal distance was found to be short. No estimation was made for the dip of the graywacke and slate bands which, together with the dip of the northeast trending faults and the south dip of the dike, control the plunge of the orebodies. Further, after a distance of 720 feet in the east tunnel from the portal on a direct bearing, various other bearings were taken until after a total tunnel distance of 1340 feet, a remaining distance of 380 feet was found necessary to arrive at the point of dike and projected contact of the upper slate band. This point should be in close proximity to the east ore body providing the ore bodies extend to this depth.

The slate and graywacke bands have a strike of N. 19° E. (declination 26½° E.) and a very regular dip of 34° W. Variations of dip and strike were noted in the slates near the northeast striking faults, however, only short displacements were noted. In the east tunnel the slate and graywacke bands were measured obliquely across the dip. Further, these bands were measured on the surface on the east slope, and the relative position of the contacts of the bands in the tunnel and on the surface gave approximately the correct position of the projected contact ahead, on which ore is expected, in relation to the dike and ore bodies above. This point of intersection of dike, east fault and upper slate-graywacke contact is held to be an ideal structure for the occurrence of an ore shoot. The management was very anxious to obtain a bearing and the approximate distance from the present face to this point of intersection.

The surface mapping above the East tunnel shows the dike to be faulted on each contact of the slate-graywacke band. Movement along the contacts and parallel to the bedding of the slates accounts for the faulted blocks of dike. Thus the dike is faulted into blocks, some north, and some south of its true line of strike. However, the general strike of the dike is persistent over its entire outcropping distance. One small block of dike was encountered in the central slate band in the east tunnel. (Note sketch No.). This is apparently a short block and no ore shows in connection therewith.

Last year an Ingersoll-Rand "Explorer" diamond drill was used in the tunnel and a total of eight holes was drilled. One hole was drilled from the face, then 90 feet back from the present face. At a point 70 feet in a 3-foot vein was cut, showing some quartz. An assay of $300 per ton from the core was reported obtained. This year the drift was extended in the same direction as this hole, and the 3-foot vein was found to be a fault, striking N. 60° E. and dipping nearly vertical. Four to six inches of a hard gray quartz was noted on the walls of this fault. In the gouge, and parallel seams of the fault, iron oxides were noted. These seams carry free gold and this was believed to account for the high values received in the drill core. The quartz is only slightly mineralized and was reported to contain only traces of gold. The strike of this fault toward the southwest is only three degrees off to the west of the bearing given by the writer to hit the dike fault intersection. The writer advised the management to follow this fault as long as it remained near its present course. Plugs were placed in the drift, giving the bearing to the intersection.

One of the peculiar features of the geology in this district is the relation of the ore to certain beds and formations. The general belief is that if a vein contains ore in a slate band, it will not continue with ore into the graywacke bed. This is very evident in the workings of the Alaska Hills Corporation on the north end of Beauty Bay. The ore on this property is in quartz veins in slate and to the east as the veins come in contact with graywacke the veins split up into a series of small stringers with no pay.

Mr. Babcock reports that the Sonny Fox vein is in graywacke and as the vein hits the slate both pay and vein ends. The Sonny Fox property is at present inactive and was not visited. In the Golden Horn prospect of Charles Goyne in Surprise Bay the quartz veins are confined to a fractured dike and end as they hit the slate on the walls of the dike.

It is generally accepted, but not proven, that the ore bodies of the Nukalaska, which occur along the walls of the dike in the slate, will not be found to contain ore in the graywacke strata. This belief is based on the lack of ore or quartz along the dike above the east workings on the surface where the dike is confined to the graywacke. Completion of the east tunnel to the dike and fault intersection, and drifting into both the strata of slates and graywacke, will determine the condition. The unknown and doubtful factor is whether or not the ore shoots or similar ones will be found at this depth, nearly 1,000 feet below.

The writer is of the opinion that the northeast-southwest faults which occur in the ends of the west workings are the controlling features which formed the structure of the ore shoots. The faulting and offsetting of the dike in this upper slate stratum formed the openings along the dike. Whether or not these openings will exist as the fault cuts the lower graywacke stratum and the lower slate stratum is yet unknown. The plunge and position of the ore shoots are controlled by the dip of the fault and the dip of the strata.

Sketches Nos. 1 and 2, showing cross sections, give the projected point of the east fault and dike intersection on the east tunnel level of the upper slate stratum. This point is the desired objective of the east tunnel, thence drifting on the dike to the west to prove the existence of the downward continuation of the ore bodies of the upper west workings.

Capps* states with assurance that these ore bodies of the west workings will continue in depth. However, he gives the rake of the ore bodies as 35° W., which corresponds to the dip of the slate and graywacke beds. On just what evidence he bases his statement that there will be a continuation in depth--whether petrographic evidence, nature of the structure or type of mineralization, is not given in this report. A study of the petrographic features of this ore may reveal information as to continuation of values in depth. A few sample specimens were collected for this purpose. Results will be given in a detailed report. It has been primarily on the strength of Mr. Capps' statement as to continuation of the ore in depth that the east tunnel project was undertaken by the company.

The continuation of the east tunnel workings into the dike-fault intersection and under the west workings is an important factor, both from an economic point of view to the company, and for the district in general. This venture will be the greatest depth to which any of

*Capps, S. R., Mineral Industry of Alaska, U. S. G. S. Bull. 897-A, p. 29.

the ore bodies have been subject to exploration within the district. The ore lenses, as they show in the upper or west workings, are lengthening horizontally and increasing in width from the surface to the drift level. Should they prove to be of supergene origin, there is much doubt as to whether or not they will contain pay to the depth of the east tunnel workings. Should these ore bodies continue to enlarge, and be proven to be of epigenetic origin, they will continue to have good values to the east tunnel workings and possibly continue as such in depth. It is the policy of the present company to continue the east workings to prove this condition.

After the mill was destroyed by fire, the west workings were abandoned and the company was reorganized and financed with W. V. Conley, Pres.; W. R. Foster, Treas.; J. S. Mathews, Sec.; and home office at 814 Fidelity Bldg., Los Angeles, Calif.

Three wooden buildings--the office, bunk house and cook house, and two tents, comprise the present camp buildings. These are located along a small creek one and one-fourth miles southwesterly from the shore of Beauty Bay. One cabin and one small store house are located on the beach. An old bunk house, ore bin and tram terminal, with inclosed blacksmith shop, are still standing at the old west workings, elevation 2200 feet. The remaining buildings consist of a compressor shed at the portal of the east workings, and a machine shop located 300 feet above camp.

The equipment on this property consists of the following: A 3700-foot aerial tram with double 7/8" cable to the old west workings (not usable); power aerial tram, single 5/8" cable, 2200 feet long, with 3/8" carrier cable, to the east tunnel workings, powered by a White auto motor; an Ingersoll-Rand detachable bit steel sharpener, powered by a 3 H. P. Fairbanks Morse gas engine; General Electric welder, powered by a Ford V-8 motor; 5x6", 165 cu. ft. per minute Sullivan compressor, powered by Ford motor; Ingersoll-Rand lyner; blacksmith shop; Ford truck; power saw; scow; Ingersoll-Rand diamond drill and 300 feet of rods.

Camp facilities are adequate under the present capacity of development. Safety conditions are none too good; first, the men ride to and from work on the power tram on a two-wheel carrier, which almost touches the ground in two places, and the carrier cable drags on bedrock in several places forming grooves. Second, no ventilation is provided in the 1300 feet of underground workings of the east tunnel. Third, the floor of the east tunnel workings is covered with 3 to 4 inches of flowing water which comes from faults, contacts and diamond drill holes. This makes a bad condition for tramming and keeping track in position. Fourth, no first-aid supplies are kept at the portal or within the underground workings. A few of these supplies are on hand in the office at camp.

Other conditions were noted such as two to three boxes of powder stored 20 feet in from the portal of the tunnel, with the powder magazine located along the road one-quarter mile below camp. A mail boat visits the property twice each month and carries the mine supplies of powder, gasoline, carbide and other material. These are on occasion carried in the same hold together. This is the only means of transportation and the boat has no definite schedule.

The total production of the Nukalaska Mining Company from 1933 to 1938, the latter year marking the burning of the mill, was reported at 2320 tons of ore milled, from which a recovery of $50 per ton in gold and silver was made. This gives a total production figure of $116,000. The concentrate ratio is 100 to 1 and 90 per cent of the gold recovered was free. A 95 per cent recovery was made from the ore. The present policy of the company is to develop and possibly mine all ore through the east workings, which will make possible all-year operation, providing sufficient ore is discovered.

July 22-24. Visited the property of the Alaska Hills Corporation.

The property of the Alaska Hills Corporation consists of five claims located 2 miles from the head of Beauty Bay on the east side of the glacial valley.

The holdings of this corporation are under lease to Dave Andrews and John Coffey, who, with two others, are operating the mine and mill under partnership. Mining by these lessees began in October, 1940 and terminated on July 27 of this year. A total of 160 tons of ore was milled.

At the request of the operators a sketch map on the scale of 1 inch to 40 feet was made of the two lower tunnel workings. The purpose of this map was to locate the position of a block of known ore on the No. 3 tunnel level. The two upper tunnel levels were caved and the workings were inaccessible. Nearly all the ore, however, was reported to have been mined out from the two upper tunnel levels and the stopes were allowed to cave. There remains good ventilation through them to the lower level.

The development within the last year has been confined to a raise and stoping between the lower level, elevation 400 feet, and the No. 3 tunnel above, elevation 520 feet. The raise was started on the vein in the back of the drift on the lower level at a point 460 feet in from the portal. Values were encountered in the raise at a point 34 feet above the tunnel level. The raise was continued to the No. 3 level above and stoping has been in progress since.

A fault which displaces the ore was encountered near the top of the raise. This fault is known as No. 2 fault and the displaced ore to the east had not been encountered. Upon completion of the writer's sketch, it was shown that this faulted block of ore was in the hanging wall and could easily be mined by extending this new diagonal raise east and into the hanging wall. A displacement of 20 feet was found.

Geology and Structure Associated with Ore Bodies of the Alaska Hills Corporation Property:

The known ore bodies found within the ~~workings of the~~ Alaska Hills workings are confined to a stratum of shaly slates, which measured horizontally across a 51° dip gives a width of 220 feet. This stratum of slate has a strike nearly north and south and is inclosed between two graywacke bands. The ore bodies occur as curved lenses formed on the limits of an upturned fold, which plunges to the north and corresponds to the dip of the ore which ranges from 50 to 60 degrees.

Two known faults, which strike at nearly right angles to the curved lines on the vein, cut the ore bodies into blocks. No. 1 fault is located 378 feet from the portal of the lower tunnel. This fault has a strike of N. 6° E. and dips 85° W. It displaces the ore 50 feet to the south. No. 2 fault is located 12 feet back from the face of the lower tunnel and has a similar strike and dip to No. 1 and displaces the vein 25 feet to the north.

The vein, as followed in the tunnel, has an over-all length of nearly 200 feet. It cuts across the slate band at nearly right angles and splits up into small seams upon hitting the graywacke strata. Its average width is less than 12 inches and the best values appear to be in curved lines in close proximity to the faults. No minable ore was encountered on the lower tunnel level. The values begin at a point 34 feet above the tunnel level in the raise. From this point minable values have extended through the upper levels to the surface, elevation 600 feet. In No. 3 tunnel two short winzes have been sunk on the vein besides the connecting raise to the lower tunnel and open stopes to the upper tunnel limits. One winze is located 170 feet from the portal and has a depth of 35 feet on a 55° incline. No. 2 winze is located 190 feet from the portal and has a depth of 10 feet. Both winzes were reported to contain good ore.

The ore quartz is milky white in color, banded, and considerably fractured from pressure and movement. It contains oxides which in places are abundant and extend to the lowest level. Oxides are also present in the slate walls. The sulphides are very fine and mostly contained in

the dark bands of quartz. They consist of, in order of abundance - pyrite, arsenopyrite, galena, sphalerite, chalcopyrite and stibnite. Free gold is in evidence. Secondary minerals consist of iron oxides, copper and lead carbonates, antimony oxides and arsenic. Accessory minerals are quartz, sericite, calcite, graphite and crushed slate pieces.

A 1200-foot, two-bucket gravity tram conveys the ore from the lower tunnel to the ore bin at the top of the mill. Thence the ore passes over a grizzly and the coarse is fed through a 7x10" Blake type crusher to a small ore bin below. From the lower bin the ore is fed by gravity, and with the aid of a home-made feeder, to a 4' Union Iron Works ball mill. The mill capacity is one ton per hour, grinding to 40 mesh. Mercury and a small amount of cyanide solution are fed by hand into the ball mill. A rotary screen on the end of the ball mill allows the feed that passes through the 40-mesh screen to flow over amalgam plates, and the oversize is returned to the mill with the aid of a home-made rake elevator and classifier. The overflow from the classifier joins the overflow from No. 1 5x4' amalgam plate and this in turn flows over No. 2 or two 5x4' plates. Thence the flow is passed through a Gibson impact amalgamator attached onto the concentrating table. The flow from the amalgamator flows over a Deister table, where nearly half of the sulphides are caught as concentrates. These concentrates assay $200 per ton in gold. One man operates the mill which is operated one shift. The mill is powered by a 66" Pelton wheel with a 94' head of water conveyed through a 16" wooden stave pipe. Two men work in the mine, and one man does the tramming and crushing.

In the mine two small blocks of milling ore are known to exist between No. 3 and the lower tunnel levels. A few pillars were reported still remaining in the stopes above No. 3 level. Below the lower tunnel level no ore is known to exist, however, there still remains 300 feet of backs between the lower tunnel level and the lowest possible tunnel level. This river level would require an 800-foot tunnel to reach under the present position of the ore in the upper tunnels.

July 25. Return to camp of Nukalaska Mining Company.

July 26 and 27. Visited the Golden Horn or Goyne property. KK-109-

The Golden Horn property is located on the west side of Surprise Bay, one-half mile south of the Narrows. The property consists of four lode claims; namely, the Surprise, Surprise Extension, Bear and Bear Extension. These claims extend from the shore of Surprise Bay in a westerly direction to the top of the divide between Surprise and Quartz bays.

The claims are held by C. H. Goyne and are described by Capps at page 30 of U. S. G. S. bulletin 897-A as the Goyne Prospect.

At the request of Charles Goyne, a sketch map was made of the lower tunnel workings for the purpose of locating No. 2 vein in its relationship to its surface outcrop. Goyne has been engaged in driving the lower tunnel by hand mining and the sketch map revealed that he had passed the No. 2 vein unrecognized.

The lower tunnel is situated 30 feet above mean high tide at the face of a small bluff and 40 feet north of a small creek. Its direction is westerly, following the general course of an east-west striking greenstone dike. The tunnel crosses the dike in various places and has a length of 514 feet, while in actual distance measured along a straight line the face to the portal measures only 280 feet. One raise connects with the upper tunnel, a vertical distance of 100 feet. The upper tunnel is located above at an elevation of 130 feet and has a length of 150 feet. The raise from the lower tunnel is located 20 feet in from the portal of the upper tunnel. Numerous small open-cuts extend up the slope above the upper tunnel to an elevation of 570 feet. These cuts expose 10 quartz lenses, unevenly distributed, but roughly parallel and obliquely inserted and contained in the greenstone dike. These 10 lenses occur within a horizontal distance of 800 feet measured along the dike. The true strike of the greenstone dike could not be determined due to numerous cross-cutting faults which have broken and offset the dike in various places. However, the strike in general ranges from N. 60° to 70° W. and it has a slight dip off vertical to the south. The quartz lenses make up on the footwall of the dike and strike obliquely across in a southwesterly direction and end at the hanging wall of the dike. The dike is inclosed in black schisted and fractured slates. The lenses are somewhat curved with widths up to 3 feet near the center and gradually thinning out near the walls of the dike. They are banded, and in various places in the wider portions bands of massive sulphides were noted. Some lenses are as close as 10 feet of each other and in other places up to 100 feet apart. As these lenses are exposed in the various surface cuts, they are partly oxidized, and as a result some cuts show free gold. In the tunnel the ore is less oxidized and free gold was not observed. Some of the lenses, in their courses of oblique strike with relation to the dike and amount of curvature, have lengths up to 150 feet--others are much shorter. These lenses have a slight and irregular dip off vertical to the southeast. In part the walls of the lenses are free and in other sections they are frozen to the dike.

No. 1 lens, or the first lens cut in the lower tunnel, is located at a point 270 feet in from the portal. A raise was extended in the footwall of this lens to the upper tunnel and intersected the ore at a point 15 feet below the upper tunnel level. Its average width is 12 inches. During the winter of 1934 35 tons of ore was stoped from this raise and shipped to the Tacoma Smelter by Messrs. Ogle and Patterson. Returns of $70 per ton were received after penalties were deducted for arsenic and sulphur. The values were mainly in gold. No. 1 lens, however, from observations, appears to be one of the poorer lenses, containing lesser amounts of sulphides and free gold on the surface.

Lenses Nos. 8, 9 and 10, which are represented by the last exposures to the west, have the greatest width and length. These also show the greater amount of free gold on the surface. Only lenses Nos. 1 and 3 have been cut in the tunnels.

Slide material and abundant overburden have covered the dike above No. 10 lens. Another lens was reported uncovered above No. 10, but was not observed. How far similar lenses will continue in this dike, both horizontally and vertically, is not known.

Tellurium was reported by Mr. Goyne as having been obtained by him from No. 10 lens. This element was not verified in a sample taken by Capps.* A spectrographic analysis of several pieces of ore taken by Mr. Goyne fron No. 10 lens, and others showing heavy sulphides, and analyzed by Laucks Laboratories, failed to detect tellurium. However, among the various elements were over one per cent cadmium and a trace of tin.

The sulphides, besides being disseminated in the quartz, also occur in massive bands up to one inch in width. These are in order of abundance - arsenopyrite, pyrite, galena, sphalerite, chalcopyrite, stibnite and pyrrhotite. Free gold occurs in the oxidized portions of the vein. Various altered products of the above sulphides were noted. The gangue minerals noted were milky white quartz, sericite, chlorite, iron oxides, graphite, carbonates and altered pieces of dike material. The gold, apparently in the unaltered ore, is more or less combined with the various sulphides and apparently only a small amount is free.

KK-104-2

The Sonny Fox Mining Company has been inactive all season. Reports were to the effect that further development is to be continued this fall and winter.

KK-104-3

The Nuka Bay Mine, located at the head of Beauty Bay, has been inactive other than annual assessment work.

*Capps, S. R., U. S. G. S. Bull. 897-A.

Eric Erickson has taken an option on the Rosness and Larson prospect, located 2 miles NE. of Moss Point. This season he has been engaged installing a pipe line and pelton wheel. This is to develop power for a small compressor. Some development is expected to be accomplished this fall. K-104-33

Earl Mount of Seward was reported as having one man engaged in doing assessment work on one claim, located up Little Creek. This claim is one mile inland from the west shore of Beauty Bay. K-104-34

There has been no recent work in quartz at Yalik Bay at which there are several prospects.

July 28-29. An attempt was made to examine the Lang gold prospect located along the west shore of Nuka Bay. The tunnel, which is located in a very thick alder slide along a steep slope, was not located.

August 2 and 3. Return to Seward.

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