U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE, Western Region
P. O. Box 11188, Federal Building
Salt Lake City, Utah 84111

Date: April 17, 1972

Reply to Attn of: WFW41.3

Subject: Tornado at Vancouver, Washington, April 5, 1972

To: Director, NWS
Silver Spring, Maryland
Attn: Emergency Warnings Branch, W117

REF: WSOM Chapter I-06

In accordance with instructions in Chapter I-06, a survey team was formed to investigate the tornado which occurred at Vancouver, Washington on April 5, 1972. Members of the team were:

Chester L. Glenn	Regional Headquarters, WXAP
James D. Wakefield	MIC, WSFO, Portland, Oregon
Philip A. Peck	PA, WSFO, Portland, Oregon
Stanley G. Holbrook	State Climatologist for Oregon

Officials from the Portland office were used in this investigation since Vancouver, Washington is directly adjacent to Portland (across the Columbia River) and is included in the Portland area of local forecast responsibility. Information was coordinated with the MIC, WSFO, Seattle and the Washington State Climatologist.

Enclosed is the report of the survey team. If additional information is needed, please let us know.

O. R. Warner
Acting Director

Copy of report to:
WSFO, Portland
WSFO, Seattle
NSSFC, Kansas City
SC, Oregon
SC, Washington

School clocks stopped 1248
Other reports at 1255

REPORT OF

VANCOUVER, WASHINGTON TORNADO

April 5, 1972

by

NATIONAL WEATHER SERVICE

WESTERN REGION

April 18, 1972

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Vancouver, Washington Tornado of April 5, 1972

Description

On Wednesday, April 5, 1972, at about 1:00 p.m. Pacific Standard Time, a squall line moving eastward through the Portland-Vancouver area spawned a tornado. It began its touchdown at the Columbia River at about 33rd Avenue and Marine Drive in Portland, where it destroyed some dock installations. Crossing the river (and the Washington-Oregon state line), it sent up a cloud of spray, and some reported seeing a waterspout. Then, as it moved up the north bank of the river and north-northeastward through Vancouver in the next 10 minutes, it left an incredible scene of destruction. Its path crossed some residential areas, where it destroyed or badly damaged about 50 homes. However, the greatest destruction occurred in a length of about 2 city blocks, where it completely destroyed the Peter S. Ogden Elementary School, then moved a block to wreck a bowling alley, then a half block to destroy a large discount store. Also badly wrecked were a lumber store, a service station and a number of other businesses in this shopping area. From here it began to skip as it moved NNE through rural areas interspersed with residential developments, where it deroofed a couple dozen homes and buildings, and completely destroyed a few. Hundreds of trees were also blown down and a few were left standing but denuded of branches. In general, the path width was 50 to 100 yards and in a few places there was evidence of multiple paths. Total length of destruction extended about 9 miles from the river, but with large skips toward the end. It has been categorized 322 on the Fujita-Pearson (FPP) scale.

Casualties and Property Loss

Six people were killed and about 300 injured. Of the injured, 54 were hospitalized, 8 of them for more than 2 days. Three of the fatalities were killed by debris carried into the parking lot of the discount store, 2 others were crushed by a concrete wall of the store, and the sixth was killed by the falling roof of the bowling alley. School was in session, but none of the children were killed, even though the building was almost totally destroyed and many children were struck or covered by flying bricks and other debris. There were numerous people in the other wrecked buildings and the deaths could easily have been much higher. Total property loss in the Vancouver area is estimated to be close to $6 million.

Warnings

This tornado situation does not fit the classic pattern and no watch or warning of tornado as such was issued. The coastal forecasts for Washington and Oregon carried gale warnings at 1010Z and 1610Z. About 11:30 a.m., Auburn Radar called the Portland WSFO to report a rapidly increasing N-S line of echoes approaching the coast of Oregon and apparently a squall line. Soon afterward, Eugene, Oregon reported strong winds and a thunderstorm. WSFO, Portland then issued at 12:10 p.m. PST a strong wind warning of 25-30 mph with gusts to 50, for the Portland-Vancouver area. Thunderstorms were not mentioned in this warning. However, it must be pointed

out that "thunderstorm" is not a strong term in the area near the West Coast. Thunderstorms in this cold air are usually frontal and do not have the surface violence that they do in the warmer air further east. The warning was disseminated to the warning list by 12:30 p.m., and was transcribed on the local VHF broadcast. About half an hour later the storm struck. SELS was notified by radar and phone, but did not put out a "box."

This tornado occurred at the boundary of Oregon and Washington. It started in WSFO, Portland's state forecast area and moved across the river into WSFO, Seattle's area. However, Portland, Oregon and Vancouver, Washington are tied so closely together that a single local forecast is issued for the Portland-Vancouver area by WSFO, Portland. Thus, Portland is also responsible for local warnings for Vancouver. Seattle has county warning responsibility for Clark County in which Vancouver is located. We are considering a transfer of this responsibility to Portland to tie in with their local forecast responsibility.

WSFO, Seattle received word of the tornado at about 1330 PST from WSO, Olympia, which had been notified by Civil Defense. The latter had attempted unsuccessfully to contact WSFO, Seattle by NAWAS. Seattle immediately sent a message on RAWARC, and this is the first word received by WSFO, Portland. At about the same time, they also received word via commercial radio news report. Portland monitors the Oregon NAWAS circuit but this circuit was slow in carrying reports on the tornado, presumably because the damage occurred in Washington.

On receipt of the tornado report, Seattle issued a statement for western Washington calling for squalls and winds to 60 mph, which was disseminated to the warning list. The 2210Z state forecast for Eastern Washington, issued soon afterward, included strong winds to 50 mph in connection with the squall line. The 1610Z forecast had carried rain and locally gusty winds for eastern Washington, while the local forecast issued at that time for the Kennewick-Richland-Pasco area had carried a wind warning. However, by local agreement a warning is carried in this forecast for local boaters whenever winds of 25 mph or higher are expected.

Further Effects of the Squall Line

Seattle reported very squally weather at about the time of the Vancouver tornado. Gusts to 87 mph were reported at building-top level in downtown Seattle. Later in the afternoon in eastern Washington, apparently in connection with the same squall line, two funnels were observed just on the outskirts of Creston (50 miles west of Spokane). One of these touched down, cut a swath through a pine grove and demolished a trailer. Total path length was 3 miles. This was about 250 miles NE of Vancouver, which suggests a squall line movement of 60 mph.

Was It A Tornado?

There is little doubt that the Vancouver storm was actually a tornado. The extreme destruction and the long narrow path are very good evidence. However, most of the trees that fell were blown to the north or north-northeast and debris was mostly carried in this general direction. About 20% of the trees that fell blew toward the northeast or southeast, and in one grove they fell in scattered directions. Hail of up to golf ball size was also reported over a path much wider than that of the tornado.

A number of witnesses reported the impression that buildings seemed to explode. Examination of the wreckage of the school shows some strong evidence in this regard. The end wall of the gymnasium which faced south toward the approaching storm fell with most of its bricks on the outside (to the south), and a section of west-facing wall was pushed westward. The east wall of the gym fell inward, and remained leaning against bleachers, which suggests a very strong east wind at this point.

Many witnesses described a roaring sound like a train as the storm approached. Those who saw the storm described structures being picked up bodily, and debris carried several hundred feet into the air and whirling in a circular pattern. The air was cold and moist, so low clouds made it hard to see a characteristic funnel. In spite of this, many witnesses spoke of a funnel shape to the storm cloud. Thunder was reported by some witnesses and many flashes were seen either of lightning or possibly sparking from broken power lines.

Synoptic Situation

Upper air charts showed a long wave trough off the west coast and a long wave ridge inland centered over the Rocky Mountains. A cutoff low off northern California imbedded in the long wave trough on April 4 moved northeastward as a minor trough on the 5th. This impulse was associated with a cold front which moved through the Vancouver area at about 4:00 a.m. Wednesday morning (April 5) and was located in eastern Washington by 1:00 p.m. The squall line which included the tornado was about 150 miles behind the cold front and was first noted by radar near the coastline. Such squall lines are not unusual in this area, and no features were noted at the time that might have suggested such unusual activity as occurred. The radar indication was not particularly alarming. The echo was described by the radar operator as appearing "flat" and not the type usually associated with thunderstorm activity. The basis for the radar warning was the rapid growth of the pattern. The situation did not fit SELS criteria for tornado activity and there was no watch issued from that office. The long wave trough remained off the coast and additional squall lines moved through the Vancouver area on April 6 and 7, but with no severe storm activity.

History

Tornadoes are rare in Oregon and Washington. In the state of Oregon, only 22 tornadoes have been documented in 84 years. Six of these have occurred

in the last 5 years. Only one death has occurred and that was in the first reported tornado in 1887. In Washington, the incidence of tornadoes has been slightly higher but no deaths have occurred until the current storm, which is the fourth tornado in the state in 4 years. The most destructive storm previously was in 1968 and passed near Seattle-Tacoma airport. Damage in that storm was about $\$\frac{1}{2}$ million dollars and there were no deaths.

Public Reaction

We found no evidence of adverse public criticism of the National Weather Service. It seemed to be generally recognized that a rare event such as this was beyond prediction. Mr. Wakefield, MIC, WSFO, Portland was interviewed on TV and was also quoted in the Oregonian. Many questions were asked regarding the predictability of such an event and his answers seemed to be well accepted.

National Weather Service Actions

Early in the path of the tornado, power lines and transformers were damaged so WSFO, Portland was on emergency power during most of the storm. At about 1430 PST (1730 EST) they notified Regional Headquarters, which then called KWBC with the message. However, the operator on duty at KWBC did not know how to relay the message to the WXAP duty officer. Further notification was withheld until the first report of deaths and injuries was received at Salt Lake City at 1700 MST (1900 EST) at which time Mr. Glenn phoned the home of Mr. James, WXAP duty officer and left the message.

Traffic was restricted into the tornado area during rescue operations on Wednesday, April 5, but Thursday morning Mr. Wakefield, MIC at Portland, Mr. Peck, his PA, and Mr. Holbrook, State Climatologist, surveyed the damage area. They were interviewed by radio, TV, and newspaper reporters and an interview appeared on Channel 2 Thursday evening. Mr. Wakefield was also quoted in an article in the Friday morning Oregonian.

On Friday, April 7, Mr. Glenn of WRH, together with Mr. Wakefield and Mr. Peck inspected the tornado site and reviewed the forecast and warning program. They were flown over the tornado site by helicopter through the courtesy of the 304th Helicopter Air Rescue Squadron.

In Retrospect

We have examined our procedures in the handling of this storm and find that there are a few changes that would be desirable. The most important item is, of course, our capability of warning the public in a meaningful way. Obviously, the strong wind warning was not adequate, but it is evident that we do not have the capability in the present state of the science to predict a rare event such as this.

Radar offers the best hope, but radar identification of tornado echoes is very subjective. The routine observational program at an ARTC Center requires that the observer be away from the consoles for 20-30 minutes at a time. Reports by citizens indicate that this tornado was probably in existence less than 10 minutes. There were no signature echoes observed on the radar. However, the rarity of tornadoes in that area would hardly prompt the radar observer to make the kind of detailed analysis necessary to identify signs of a tornado echo.

A number of actions have resulted from our investigation of this storm, principally in connection with the reporting of these rare events.

1. NWS monitoring of NAWAS is being reviewed for maximum effectiveness.
2. Consideration is being given to giving WSFO, Portland the County Warning Responsibility for Clark County, Washington.
3. Our procedure for reporting these events to NWS Headquarters officials during off-duty hours is being changed. Reporting via KWBC was not effective, so we will call EWB officials direct.

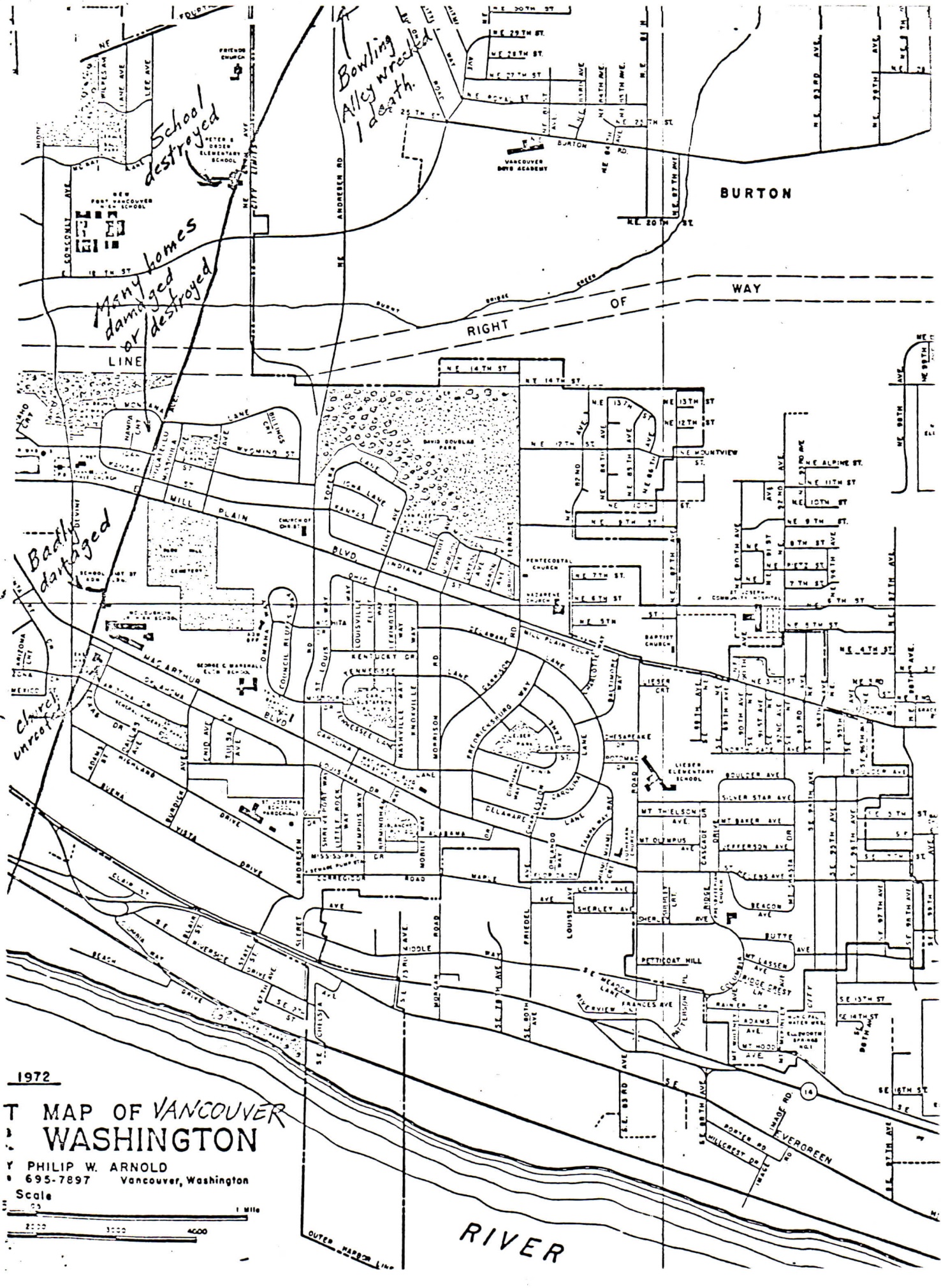
Attachments

Three attachments are included in order to clarify some of the points discussed in this report.

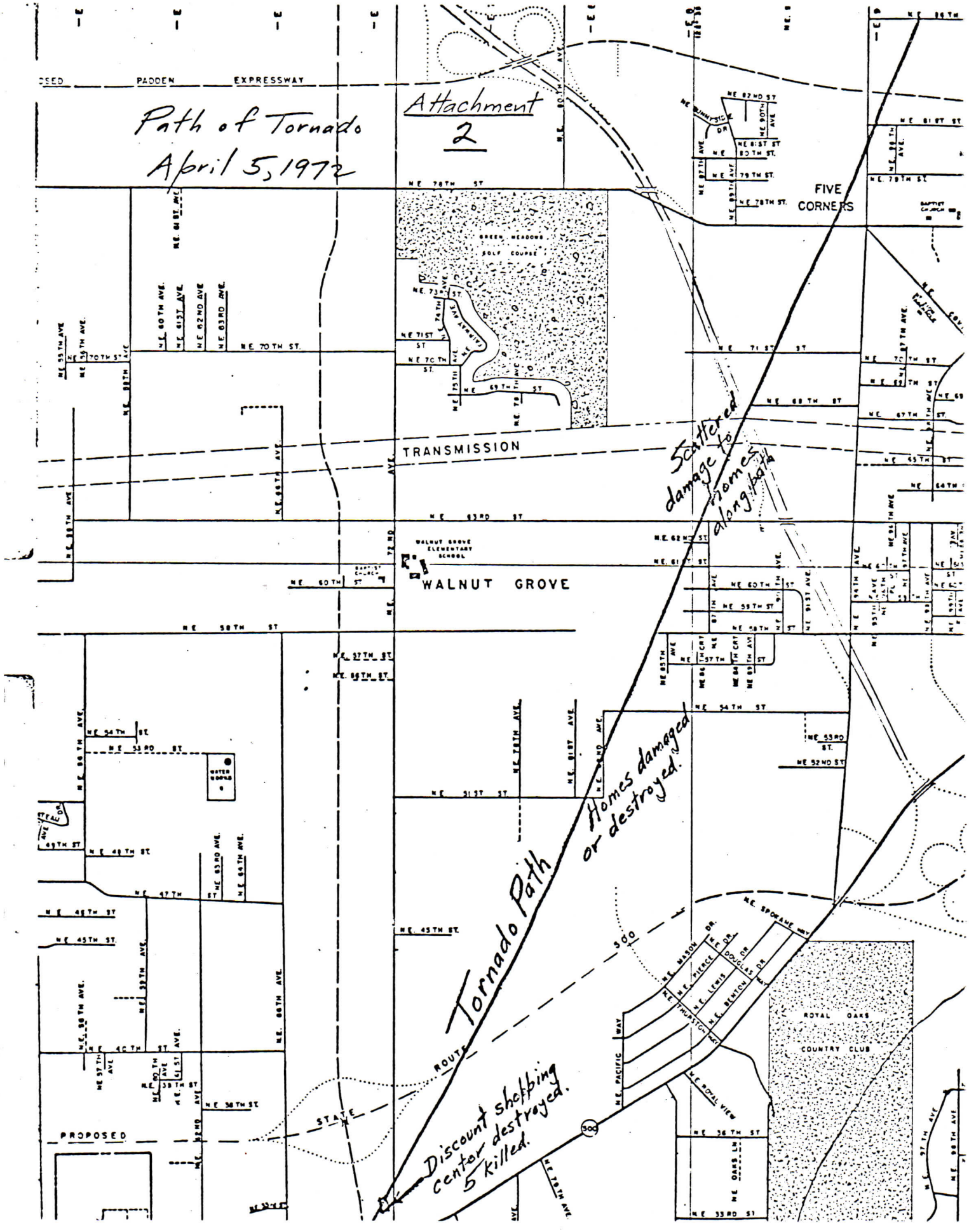
Attachment 1 is a number of newspaper photos of the destruction. We have other newspaper pictures, as well as about 30 $3\frac{1}{4}$ x $3\frac{1}{4}$ color photos taken both from helicopter and from the ground.

Attachment 2 is a map showing the tornado path and main destruction areas.

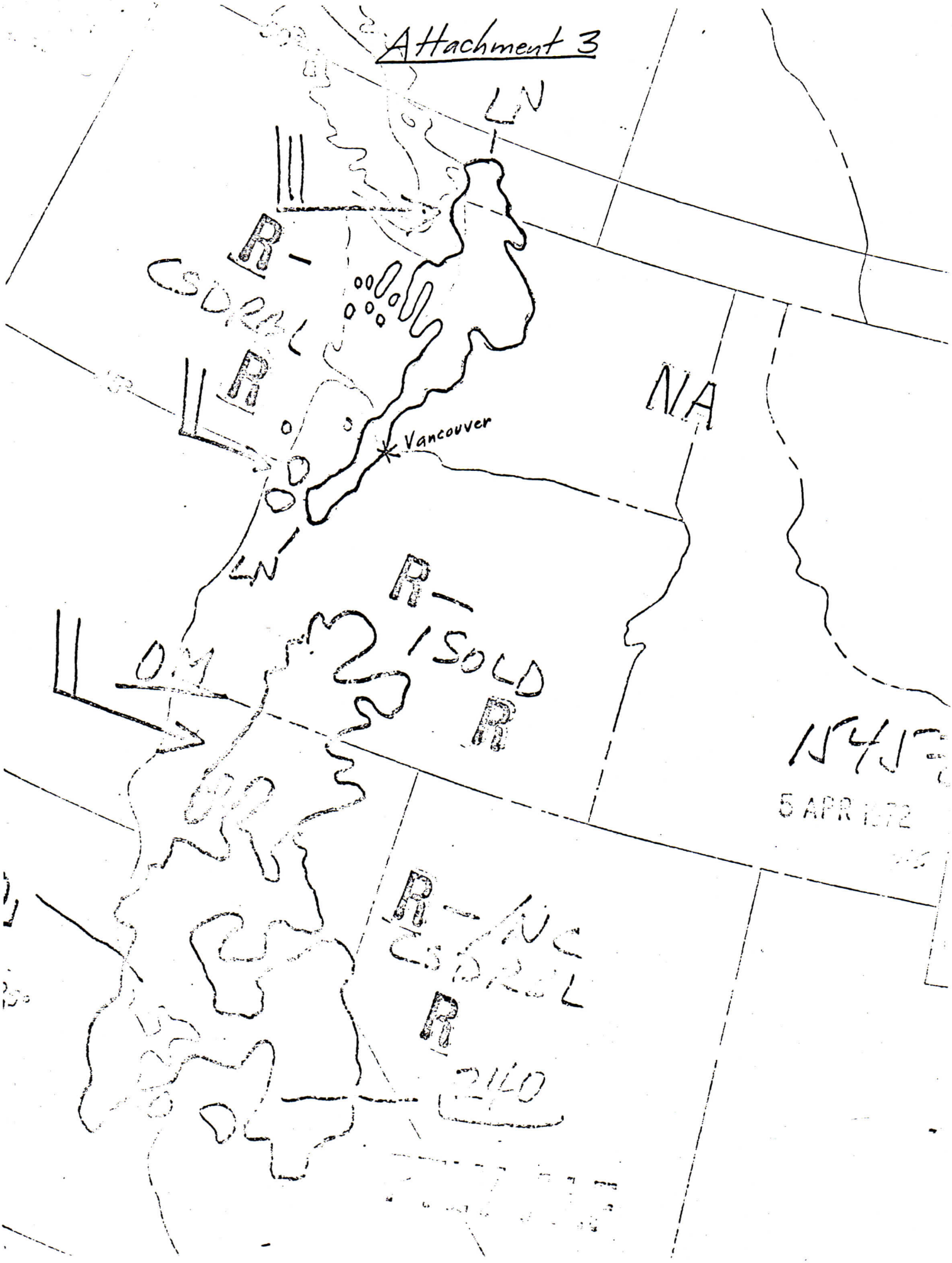
Attachment 3 is taken from the radar overlays, and shows the radar echoes associated with the squall line.

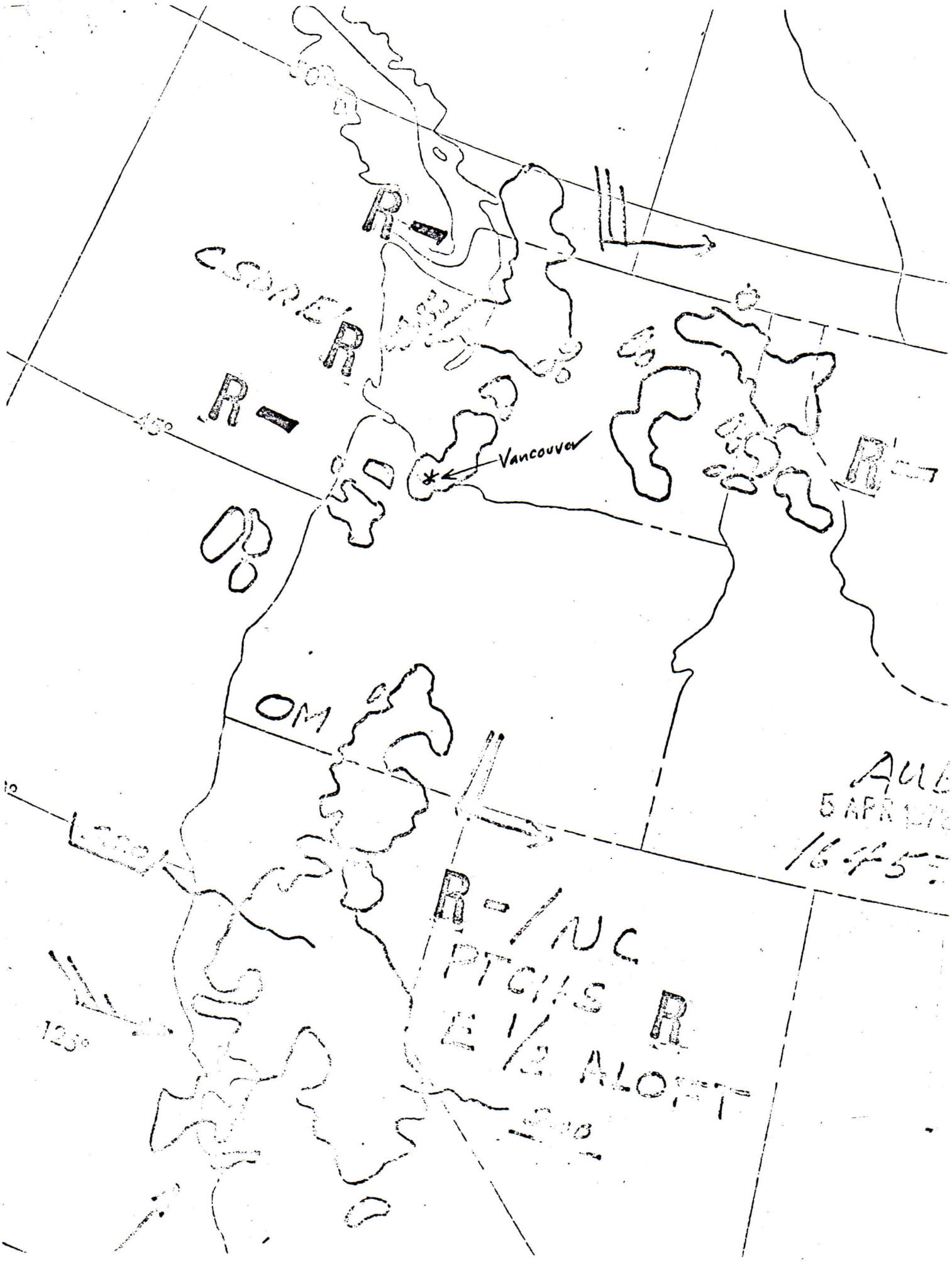


School destroyed
Bowling Alley wrecked 1 death.
Many homes damaged or destroyed
Badly damaged
Church unroofed
BURTON
RIGHT OF WAY
LINE
MILL PLAIN BLVD
MACARTHUR BLVD
ANDRESEN RD
EVERGREEN
RIVER
1972
T MAP OF VANCOUVER
WASHINGTON
Y PHILIP W. ARNOLD
695-7897 Vancouver, Washington
Scale
1 Mile
2000
3000
4000

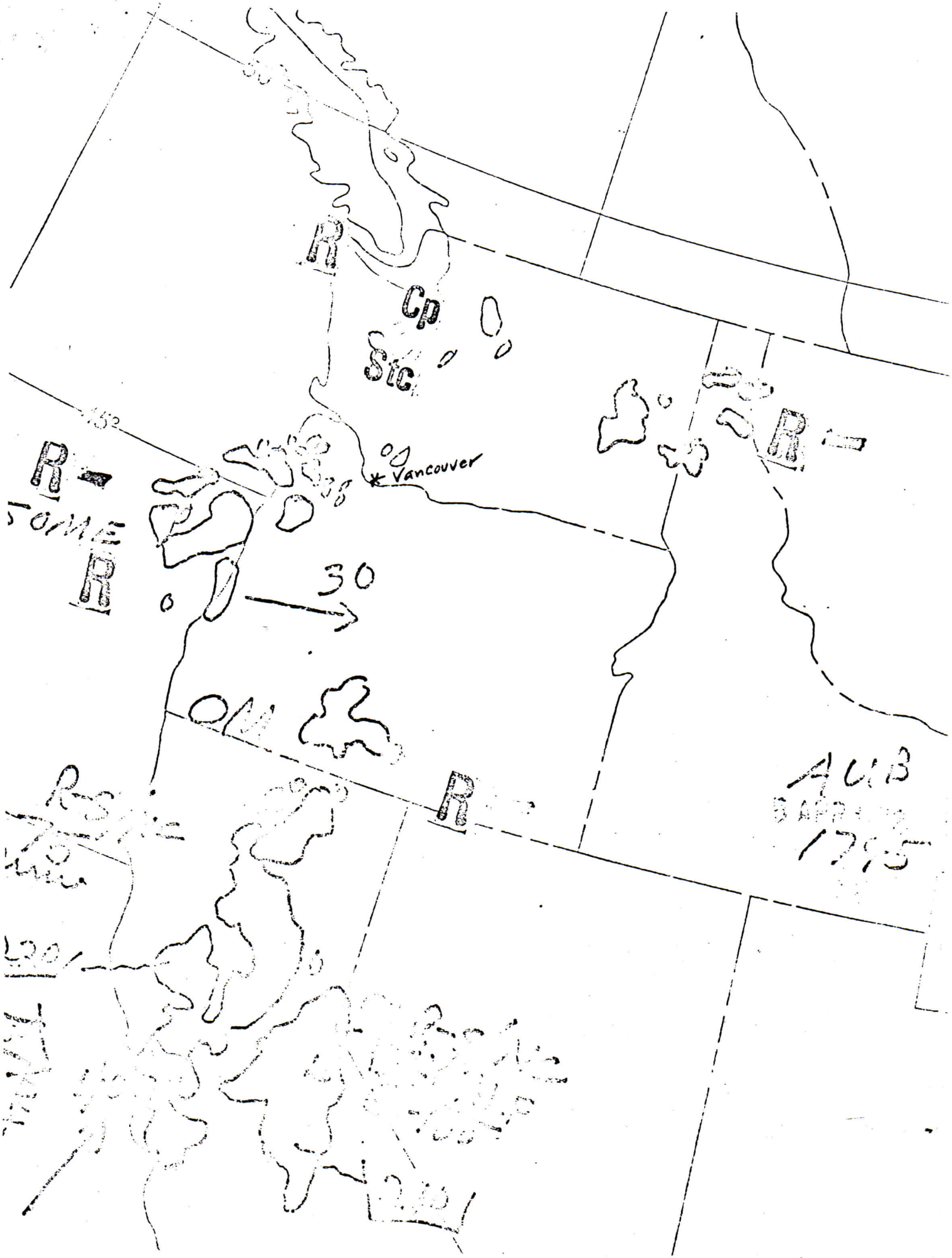

Path of Tornado
April 5, 1972
Attachment
2
PADDEN EXPRESSWAY
FIVE CORNERS
GREEN MEADOWS GOLF COURSE
TRANSMISSION
WALNUT GROVE
WALNUT GROVE ELEMENTARY SCHOOL
Scattered damage to homes along path
Homes damaged or destroyed.
Tornado Path
Discount shopping center destroyed. 5 killed.
ROYAL OAKS COUNTRY CLUB
PROPOSED
STATE ROUTE 500

Attachment 3

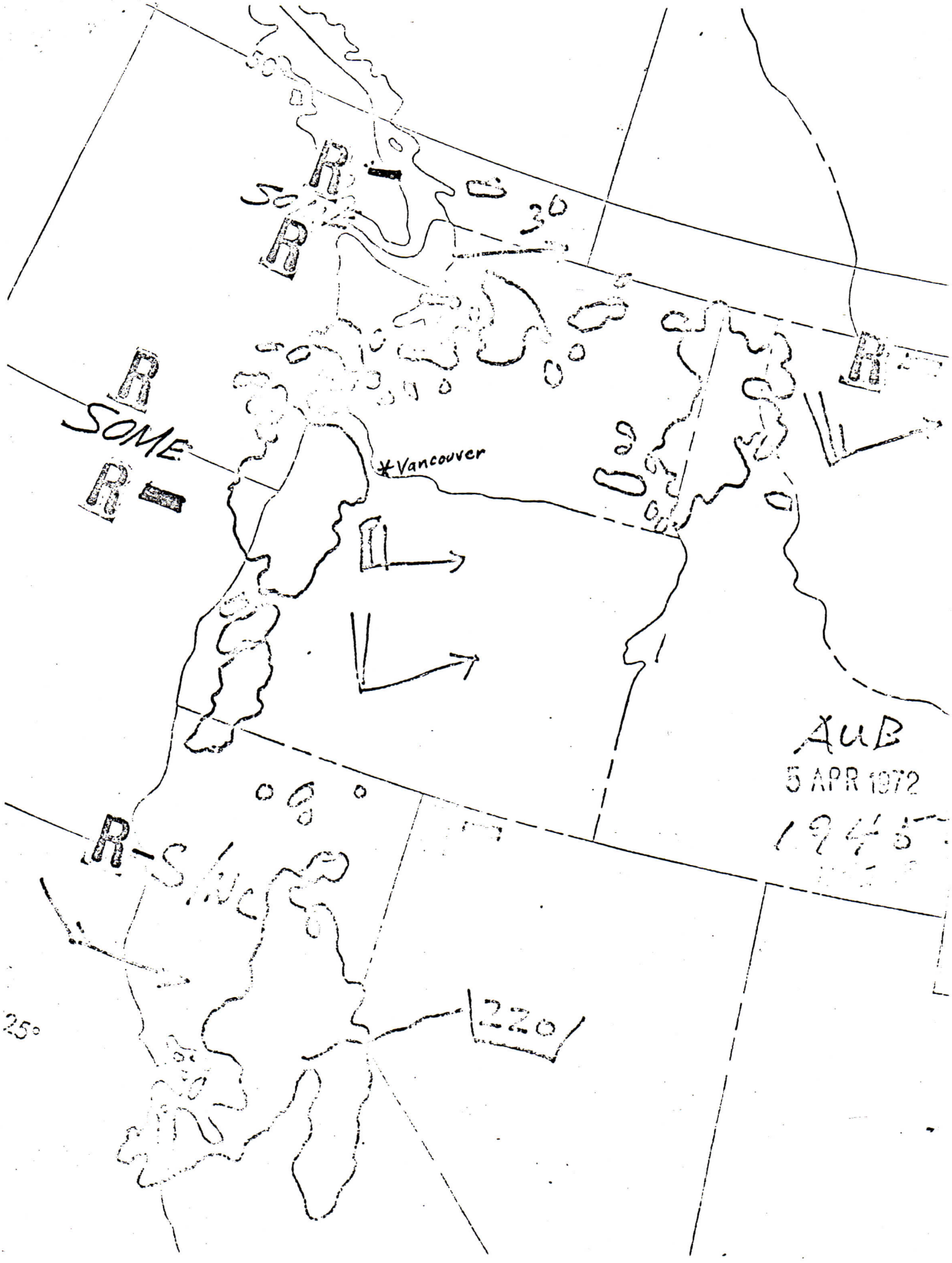




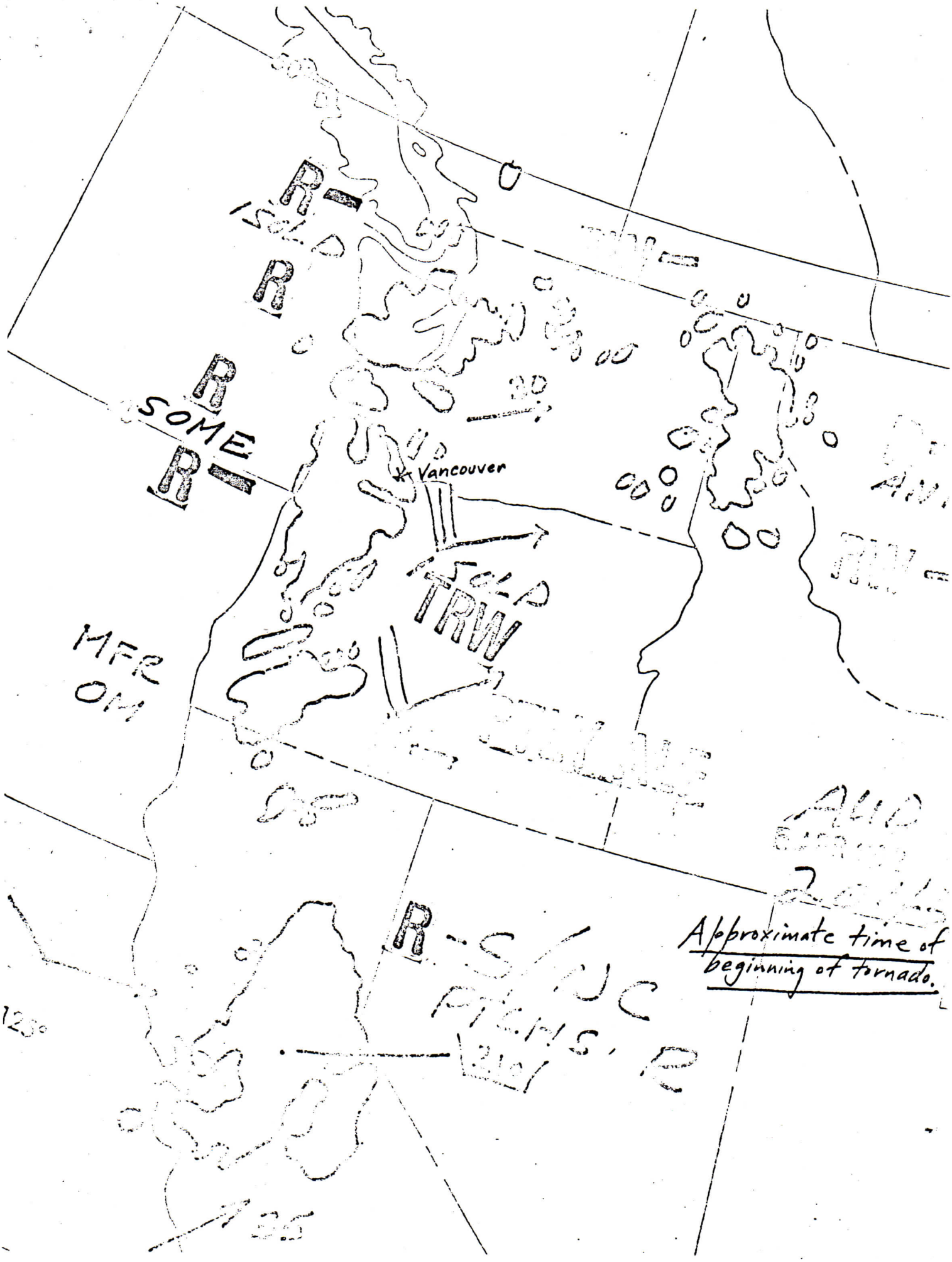
50°
R
CSDRE
R
R
45°
Vancouver
R
OM
AUL
5 APR 197
1645
R-/NC
PTCHS R
E 1/2 ALOFT
125°

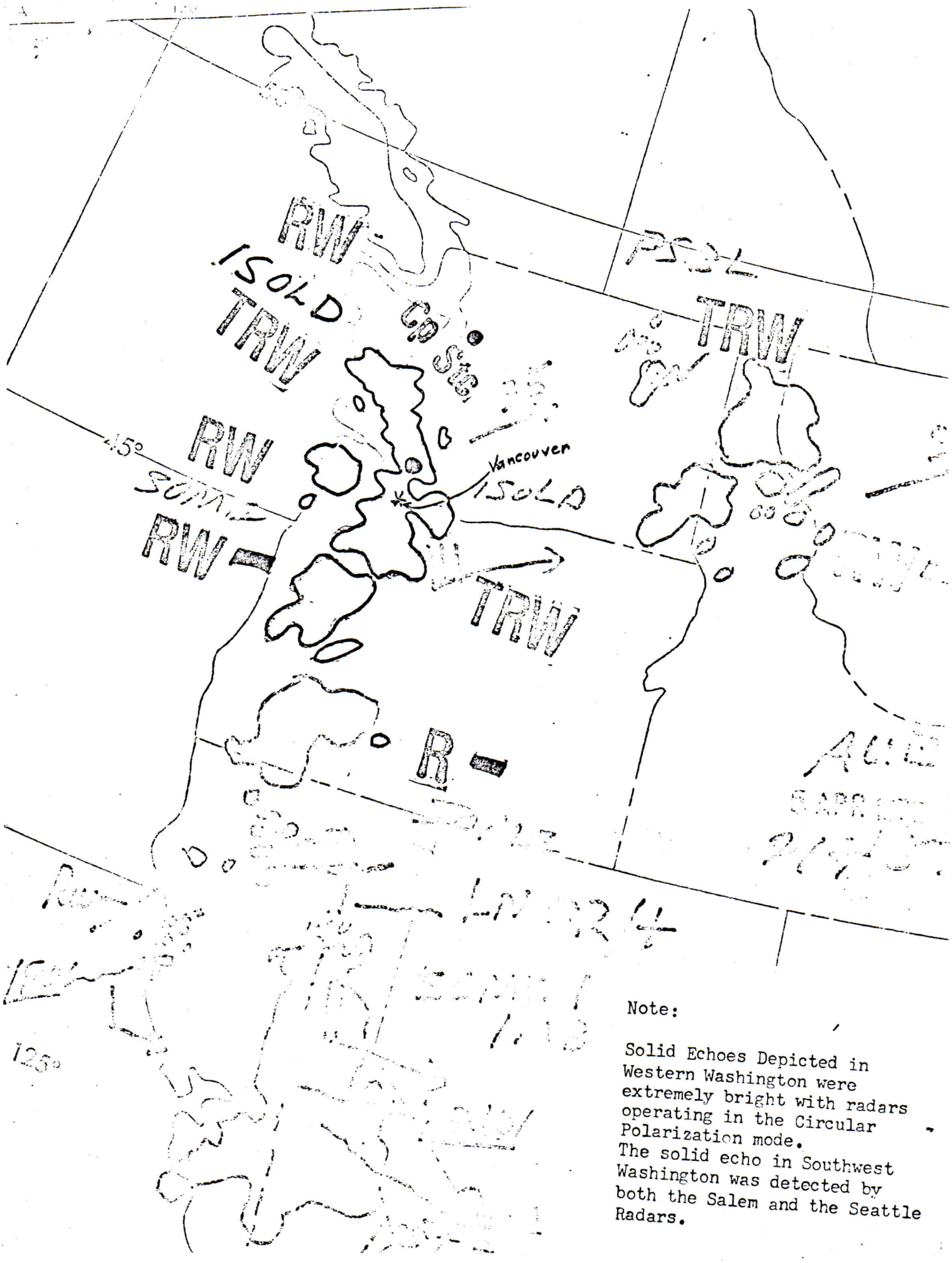

R
Cp
Stc
R
R
Vancouver
SOME
R
30
OM
R
AUB
1795

R–
ISOLD
R
R–
R
Vancouver
L
R–
R–



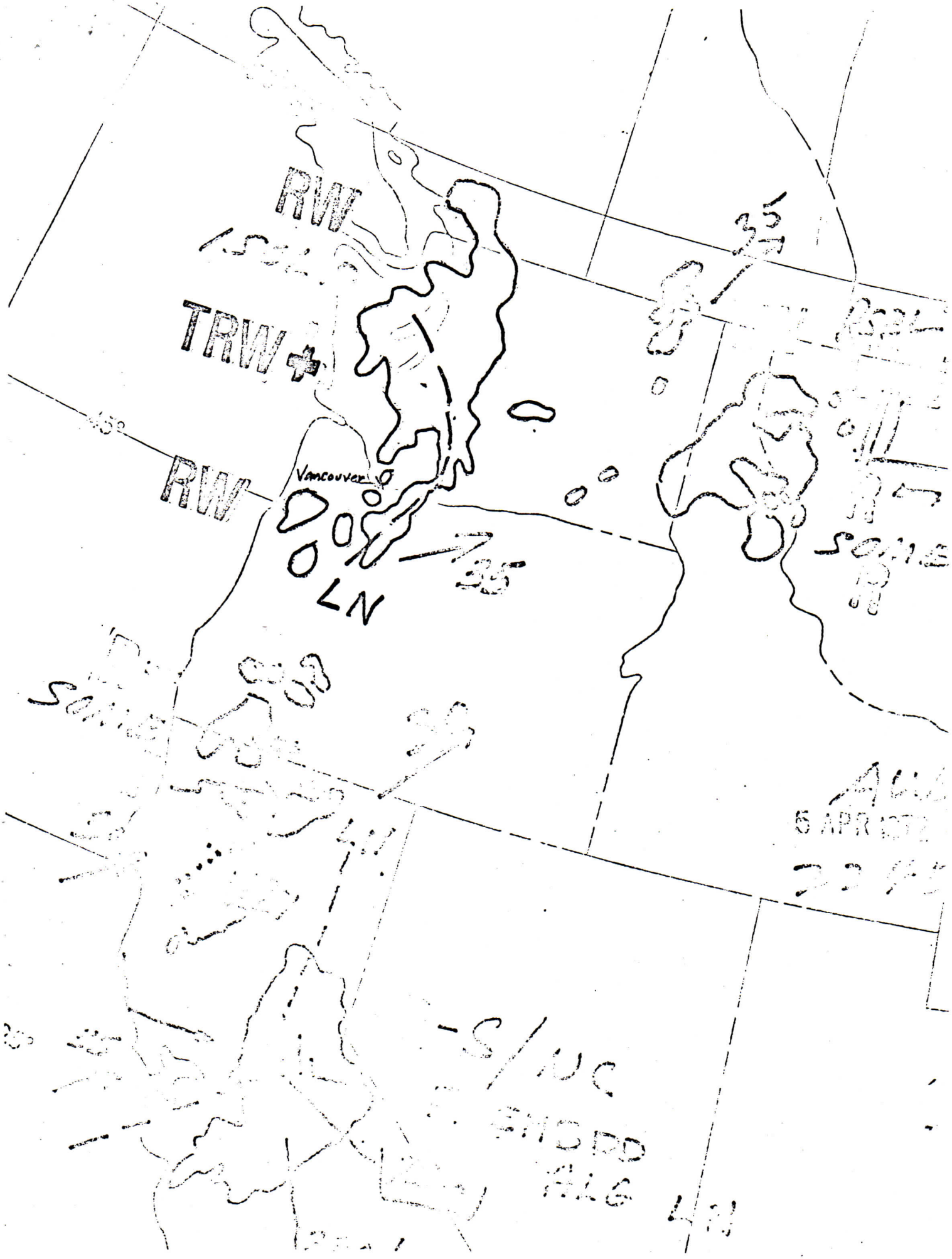
50°
R
SOME
R
30
R
SOME
R
*Vancouver
R
R-S/NC
220
25°
AUB
5 APR 1972
1945

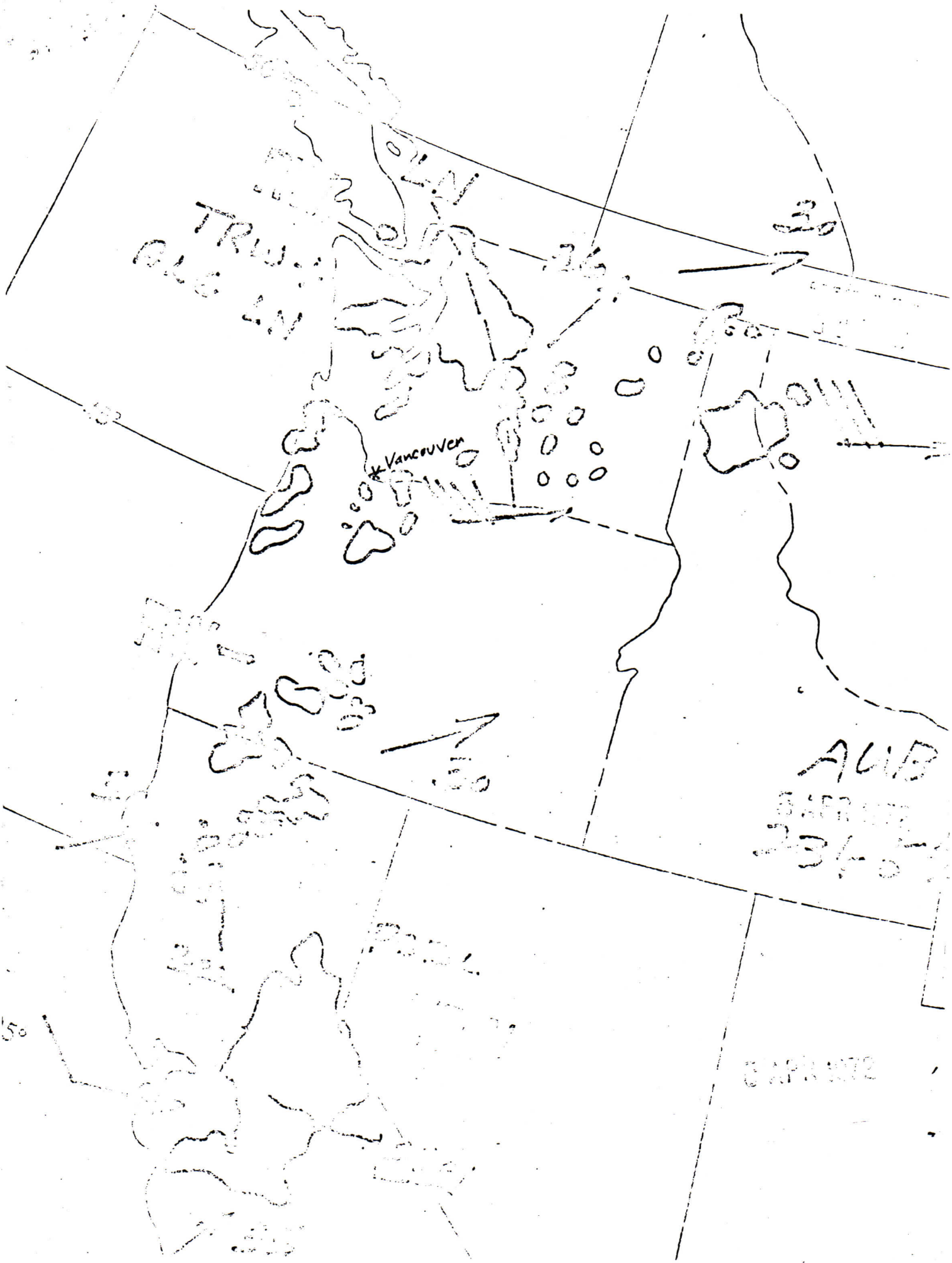

Vancouver
Approximate time of beginning of tornado.



Note:

Solid Echoes Depicted in Western Washington were extremely bright with radars operating in the Circular Polarization mode.
The solid echo in Southwest Washington was detected by both the Salem and the Seattle Radars.


RW
TRW
RW
Vancouver
LN
35
35
SOME
SOME
5 APR
S/NC
ALG


Vancouver