This material is a section in the report "Robert Patrick O'Riley Fortune and the 6th Bomb Group (Very Heavy) in WW II." It is provided here because it might be of general interest to those who are not interested in the full report.

B-29 Losses in the Pacific Theater

There is some controversy about the extent of 20th Army Air Force plane losses in the Pacific. At one end is a popular view that B-29s were being shot down or otherwise destroyed with high frequency. At the other end is the now widely held view that this was a relatively safe way to engage in combat, that, in Ernie Pyle's words, combat missions in a B-29 were "milk runs."[1] A naïve analysis of the missions executed by the XXI Bomber Command in 1945 lends weight to the "milk run" position: of the 315 missions flown, 214 (68 percent) involved no loss. But a closer look suggests more danger.

The most common approach to the question is to focus on the risk of a B-29 being lost, that is, the risk of not returning to duty after a mission due to enemy action, mechanical failure, crash landing and ditching, or other reasons. The proportion of planes lost is, of course, greater than the proportion of men lost: many losses were crash landings in which the plane was destroyed but few or no crewmen died; others involved shoot-downs over the target with the crew bailing out and surviving, often as POWs; still others were like the well-documented loss of the 6th BG's *Ann Garry II*: the plane ditched after the crew bailed out after running out of fuel; all crewmembers survived. But in the absence of data on people lost, it makes sense to focus on planes lost.

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[1] Ernie Pyle was a famous war correspondent killed on Ie Shima, a small island off of Okinawa. Those who flew the "milk runs" scorned Pyle's statement: one 6th Bomb Group B-29 was named *Ernie Pyle's Milk Wagon*. It was renamed *Uncle Sam's Milk Wagon* after Pyle's death.

In the vernacular, a mission and a sortie are synonymous: a crewman embarking on a sortie said he was going on a mission. However, in official language they are different: A mission is the execution of an order to send planes into combat; it could involve many planes, and it could have several targets, sometimes in different countries (Japan, Korea, China). During 1945 the XXI Bomber Command executed 315 B-29 missions, losing a total of 279 planes for an average of 0.9 B-29s lost per mission (the *Mission Loss Rate*). A sortie is an individual plane sent on a combat mission; the XXI Bomber Command flew 26,025 sorties in 1945, an average of 83 sorties (planes flown) per mission. The 279 planes lost yield a Sortie Loss Rate of 1.1 percent.

The *Sortie Loss Rate* is an answer to the question "What was the probability of a representative B-29 being lost on a combat mission?" The 1.1 percent Sortie Loss Rate supports the conventional view of a mission as a walk in the park.[2] Of course, the Sortie Loss Rate varied considerably by mission and by Bomb Group. The highest Sortie Loss Rate for the XXI Bomber Command was 20 percent, experienced on Mission 153 (May 7), a mission with only 10 planes. On the "most difficult" missions (Mission 181 and 183, on May 23-24 and May 25-26, respectively) the XXI Bomber Command flew 1,056 sorties, losing 33 planes for a 3.1 percent Sortie Loss Rate, triple the average. So while most missions were benign, those with losses could be very bad.

The Sortie Loss Rate tells a crewman something about the chances that his plane will not return to duty after flying a single mission. This is important information, but more important to his psyche is whether his plane will *eventually* be lost: one is less

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[2] Data for this section are from individual mission summaries issued by the 20th AAF, not from aggregate tallies reported in the AAF Statistical Digest.

likely to be concerned about the exact mission one's plane goes down on than about whether the plane he is on will go down at some point.

Since each crew had a quota of thirty-five missions (sorties)[3] before it could rotate back to the "Zone of the Interior," what mattered to a crewman was the *35-Mission Loss Rate*: the probability that a plane would not survive for the required thirty-five sorties. This can be worked out from the average Sortie Loss Rate with the simplifying assumption that the same loss rate applies to all sorties.[4] At the XXI Bomber Command's 1.1 percent average Sortie Loss Rate, the 35-Mission Loss Rate is 32.1 percent, that is, a plane had roughly a 33 percent chance of being lost before the crew could reach thirty-five missions and rotate home. That will get an airman's attention!

What about the 6th Bomb Group? It flew 1,736 sorties on seventy-five missions, losing 18 planes (9 in combat, 9 for operational reasons); its average Sortie Loss Rate was 1.1 percent, matching the XXI Bomber Command's experience, so its 35-Mission Loss Rate was also 32.1 percent. But on the two missions of May 23-24 and May 25-26, the 6th Bomb Group flew 57 sorties and lost 6 planes, a 10.5 percent Sortie Loss Rate.

Obviously, the sortie loss rate was not the same for all missions. A more careful insight into the prospective loss probability is the *Forward 35-Mission Loss Rate*. Consider the following mental experiment. A higher being, call it "***IT***," is armed with foreknowledge of the loss experience on each mission flown in 1945 by the XXI Bomber Command. Before the first 1945 mission (January 3), ***IT*** computes the actual loss rate to be experienced by a typical B-29 over the next thirty-five missions using the actual loss

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[3] In the European Theater the quota was twenty-five missions, eventually increased to thirty-five and, for some units, to fifty. The Pacific quota was initially thirty missions, soon to be was raised to thirty-five. The first crew in the 6th BG to reach 35 missions was the crew of *Here's Lucky*, in late June of 1945.

[4] If L is the average mission loss rate, the 35-Mission <u>Survival</u> Rate is $(1-L)^{35}$ and the 35-Mission <u>Loss</u> Rate is, therefore, $1 - (1 - L)^{35}$.

rates experienced on those future dates (IT can do this because *IT* has perfect knowledge of the future); *IT* calls this the Forward 35-Mission Loss Rate for January 3 and, because *IT* lives in a very bureaucratic society where acronyms abound, *IT* denotes this as F35MLR. *IT* will find that on January 3 the F35MLR is 0.53, indicating a fifty-three percent chance of the plane being lost before completing thirty-five missions: this is less than even odds of a plane's survival through thirty–five sorties.

IT then computes the same statistic for the date of the next mission (January 9), then for each subsequent mission date up to June 24—the last date on which there are thirty-five missions remaining in the war. After June 24 the F35MLR is calculated using fewer than thirty-five missions, up to August 13 when there is only one remaining mission.[5]

The values of F35MLR so computed are shown in the chart below; for comparison, the average 35-Mission Loss Rate used earlier (32.1 percent) is also shown.

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[5] After June 24 there are fewer than 35 missions remaining in the war, but the statistic F35MLR still describes the probability of a typical plane surviving the war.

XXI Bomber Command
Forward 35-Mission Loss Rate
January 3, 1945 - August 14, 1945
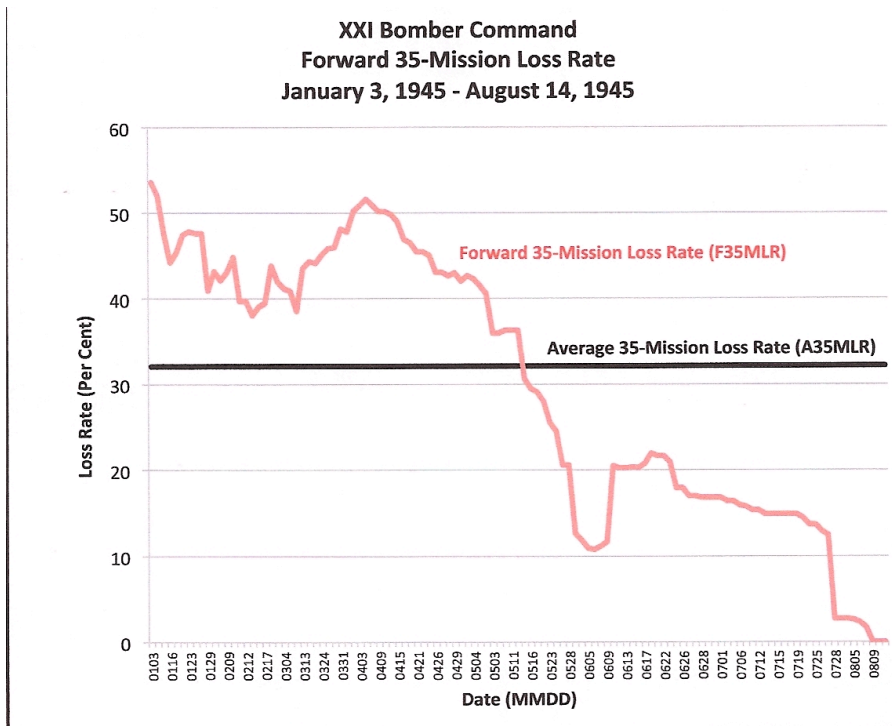
What would *IT* say about the risks of flying combat missions in a B-29 in the Pacific in 1945? First, there are periods when F35MLR is quite high; particular days are January 3 and April 7, when the Forward 35-Mission Loss Rate exceeds fifty percent. Second, the Forward 35-Mission Loss Rate shows pronounced cycles, dipping to 11 percent on June 7, rising to 22 percent on June 19, then dipping down to zero on August 14. A crewman armed with *IT*'s information would find that periods of serious possibility of not making it are followed by periods of near-boredom. Finally, there is a downward trend in the Forward 35-Mission Loss Rate as it reaches zero just before the end of hostilities.

This mental experiment gives a useful picture of the loss experience. A plane's survival chances varied considerably over time, with some periods when survival through the mission quota was, at best, an even-odds prospect, others when survival prospects were quite high (particularly toward the war's end).

Thus, the answer to the question "How risky was it to be a crewman on a B-29 combat plane" is not as simple as often assumed. The common answer—"not very"—is based on the frequency of sorties with no losses, and on the low average Sortie Loss Rate. But the evidence indicates that, on average, the typical XXI Bomber Command plane had a 1 in 3 chance of being lost before it satisfied the mission requirement; this was also true of a typical 6th Bomb Group plane. And over time there were episodes of even greater risk. Life in the Pacific had its milk runs, but it also had its times of serious danger!