

Historical Overview of the SiDet Workforce for Collider Run IIa

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The Particle Physics Division Office has reconstructed the amount of effort that went into the CDF and DZero silicon detectors for Collider Run IIa by looking at the SiDet Workforce as a function of time during these projects.

During this period, SiDet was a group within the PPD Technical Centers Department, and Mike Crisler, Head the TC Department, kept track of the arrival and departure dates of SiDet techs. His totals included CMM operators, CMM programmers, Wire Bonders, Mechanical Techs, and Electrical Techs, but only those within TC / SiDet. I have added similar information on seven other people in other PPD departments. This explicitly includes the type of people now in the PPD Mechanical Department stationed at SiDet in support of the engineers and facility. I have not included any engineers or physicists or computing professionals in the list.

The plot of SiDet technical people as a function of calendar year quarter is shown below in Figure 1. The plot cuts off at the end of 2001 Q1 when the projects ended.

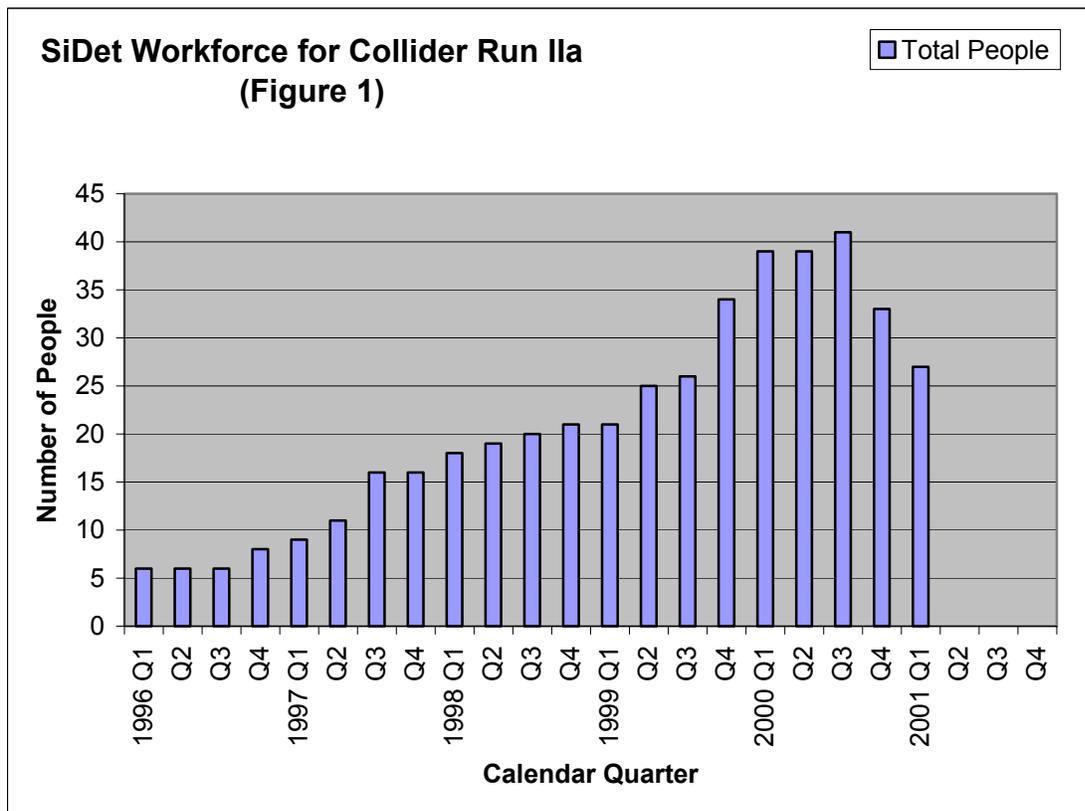


Figure 1 requires several comments:

- The peak is different from the numbers in the Howell-Ray-Reichanadter report because we are including additional people in this overview.

b. The rate of rise of the staffing level was dictated in 1996-1999 Q1 by the lack of parts to assemble the final Run IIa silicon. When the crunch came in late 1999-2001, we were able to hire people from outside the lab at the rate shown in 1999 Q3 – 2000 Q1, specifically we were able to increase the SiDet staff by 18 people between May, 1999 and June, 2000. This nearly doubled the workforce, and only 3 of these 18 came from existing positions at Fermilab.

c. The integral over all quarters in Figure 1 amounts to 441 FTE-quarters or 110 FTE-years or 229,320 hours (assuming a 2080 hour year).

To check the Run IIb estimates, we also need to understand the amount of overtime worked by these people in the Run IIa projects. The PPD Office has taken the actual list of people by name and extracted the overtime hours worked by each individual during 1996 – 2001 Q1. A surprisingly small total of 11,222 overtime hours were worked. Figure 2 shows the ratio of overtime hours to regular hours as a function of calendar year.

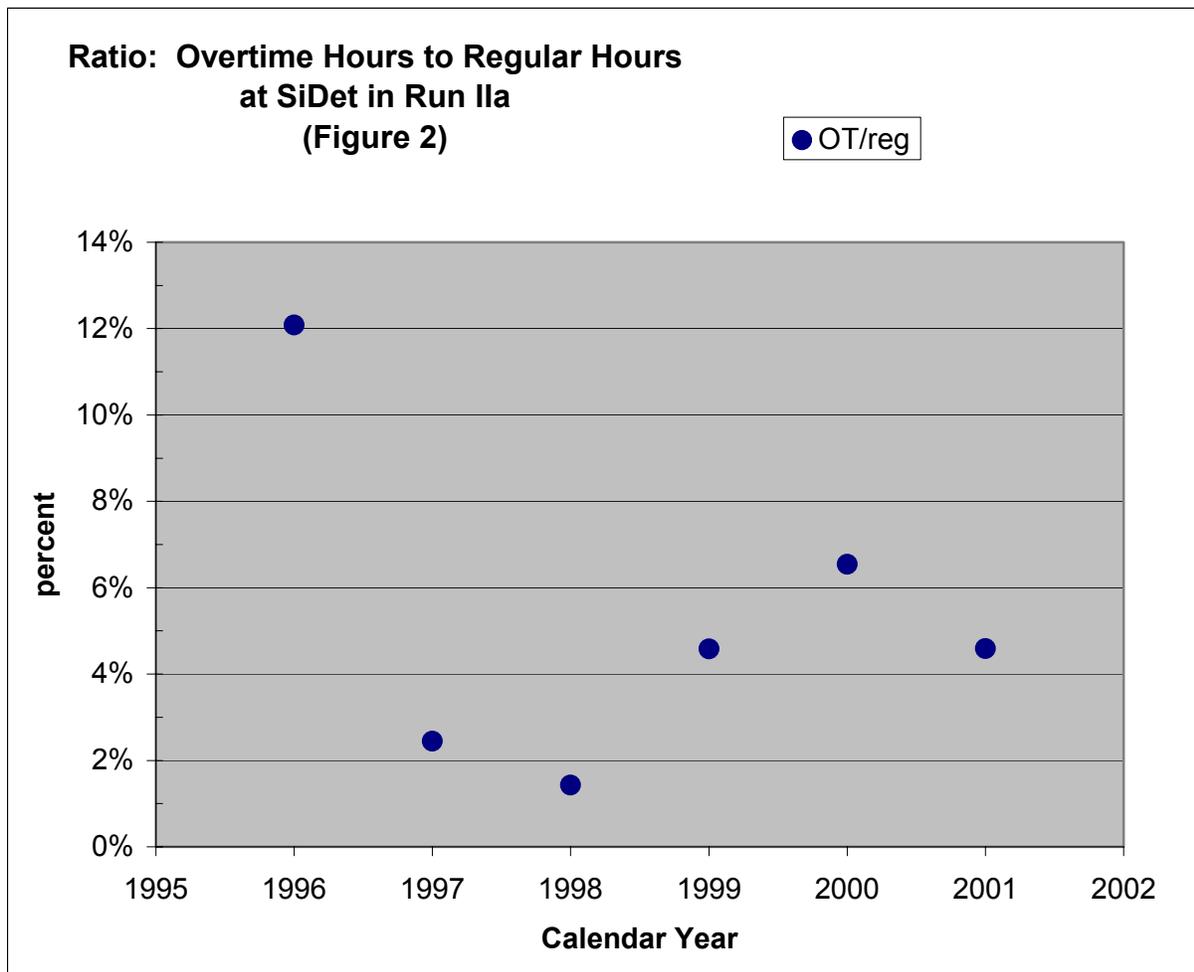


Figure 2 deserves some comment:

1. The high overtime fraction in 1996 reflects a SiDet staff that had not yet been fully formed to handle Run IIa. That is, people worked a large amount of overtime during the R&D phase.

2. The rest of the project shows that overtime (therefore SWF contingency?) was low in the early years of the project and peaked when the construction tasks peaked in 1999-2000.

Including the overtime, the total amount of work (paid for) now amounts to $229,320 + 11,222 = 240,542$ hours. To perform a reality check against the Run IIb estimates, we should make one adjustment to this total:

Multiply the regular hours by 0.85 to account for the fact that the Run IIa workforce did actually take vacations and have other paid time off during the five years of the project.

We should NOT multiply by another 0.85 to take into account coffee breaks, bathroom breaks and other inefficiencies, because the Run IIb schedules also include this inefficiency factor in their base estimates.

This gives an adjusted total of 206,144 hours of technical staff work on scheduled tasks for Run IIa.

The lore in Run IIa was that DZero used about 10% more technical labor than did CDF. This stemmed from different philosophies in the two collaborations about what type of person should do some of the tasks. I believe those different philosophies persist in the Run IIb estimates. Therefore I conclude we should compare the Run IIb estimates against the following :

DZero had a total of 107,980 hours of SiDet technical staff work on their silicon projects for Run IIa.

This included work on barrels, on F-disks, and on H-disks.

CDF had a total of 98,164 hours of SiDet technical staff work on their silicon projects for Run IIa.

This included work on Layer Zero-Zero, on SVX-II, and on the ISL silicon.