USPB / SFA
OUT-OF-STORAGE CHIP QUALITY
2011-2012 MICHIGAN REGIONAL REPORT

Chris Long and Luke Steere, Michigan State University

Procedure:

The 2011 USPB / SFA Chip Trial was harvested on October 12, 2011 at Sandyland Farms LLC, Howard City, MI. The crop experienced 3036 GDD, Base 40 from planting to vine kill. At harvest, several chip storage samples were collected from each variety. Two, 40 pound samples were collected from each entry and placed in the cooperating grower's commercial storage to be evaluated in December 2011 and March of 2012 at Herr Foods, Nottingham, PA. (Tables 1-2). The 40 pound tuber samples placed in the grower's commercial storage were removed from storage in early December 2011 with a pile temperature of 57 ºF and in mid-March 2011 with a pile temperature of 55 ºF. For sprout control, CIPC was applied to the storage in November 2011.

Twenty-four, 30 tuber samples were also collected from each trial entry at harvest and stored in two bulk storages at the Michigan Potato Industry Commission's (MPIC) Cargill Potato Demonstration Storage Facility. One set of twelve samples were stored at approximately 55ºF for monthly evaluation from October 2011 through June 2012. The remaining twelve, 30 tuber samples, were stored at approximately 48ºF and evaluated from October 2011 to May 2012. These samples from the MPIC storage were processed at Techmark, Inc. for a glucose value (percent of fresh weight), a sucrose rating (percent of fresh weight X 10), an SFA color score and an undesirable chip color score. The undesirable chip color score was reported as a percentage, by weight, of the total chips that were evaluated. For sprout control, CIPC was applied in the MPIC storages in November 2011.

Results:

Tables 1 and 2 summarize the chip quality of the 40 pound samples after being processed at Herr Foods, Inc. on December 8th, 2011 and March 19th, 2012. The varieties are listed in yield order, high to low, top to bottom, based on the 2011 field trial data, not based on Herr's quality rankings. As seen in Table 1, W2310-3, MSL292-A and ND7519-1 exhibited the least amount of chip defects. These same three varieties displayed the best SFA chip score. Overall, Herr Foods ranked MSL292-A as the top performing variety in the December 8th fry test.

From Table 2, Snowden was selected by Herr's as being the best overall performer in the March 19th fry test with 13.3 percent total chip defects recorded. CO00188-4W had 11.7 percent total chip defects and MSJ126-9Y had 16.2 percent.

Figures 1-48 summarize the 30 tuber chip quality samples collected at harvest from each entry and stored at the MPIC Demonstration Storage in the fall of 2011 at two temperatures. Two graphs are provided for each line at each temperature, for a total of four graphs per line. The first graph in each temperature is the sugar concentration and average pile temperature curve, showing the relationship of the bin temperature on physiological age and sugar stability of each variety. The second graph shows the change in SFA chip color and sugar related color defects over time in storage at the given temperature regime. The comments about the varieties below are in yield order, high to low, top to bottom, based on the 2011 field trial results.

NY140: NY140 had an average to above average chip quality performance at Herr Foods on both processing dates (Tables 1-2). Glucose levels were excellent for this variety at both storage temperatures. Sucrose trended downward into late March 2012 when this variety was stored at 55 ºF (Figure 3). At 48 ºF, this downward trend was extended into late April 2012 (Figure 2). Chip color and color defect scores were excellent at both storage temperatures (Figures 2, 4). This variety expressed amazing chip processing quality late in storage.

Atlantic: Atlantic provided a chip quality reference point for the variety trial directly out of the field. Herr's did not process Atlantic in December 2011 or March 2012 (Tables 1-2). No storage sugar data is provided in Figures 1-60 for this variety.

W2310-3: This variety performed below average on March 19th, at Herr Foods, but was identified as one of the top performers at the December 8th chip quality evaluation (Tables 1-2). Sucrose levels in the 48 ºF storage samples appeared to be variable in February and March 2012 (Figure 5). Sucrose values appeared to stabilize in late March and April prior to dormancy break in late April 2012. Chip quality remained acceptable season long with some small amount of color related defects appearing in late February 2012 (Figure 6). At 55 ºF, the sucrose value declined into late February 2012 (Figure 7). Dormancy appeared to advance quickly in these potatoes in late April 2012. Chip quality and color defects remained good until the tubers broke dormancy (Figure 8).

NYE106-4: NYE106-4 was an average chip quality performer out of the field, but ranking second overall at Herr Foods on March 19th, 2012 in the overall chip quality performance (Tables 1-2). Figures 9-12 show almost identical chip quality performances for this variety regardless of storage temperature differences. This variety appears to have good storage chip quality.

Snowden: Snowden had an above average chip quality performance at Herr Foods on both processing dates (Tables 1-2). Snowden stored acceptably until late March 2012 at 55 ºF (Figures 15-16). From Figures 13 and 14, the chip quality in this variety was best prior to mid-April 2012.

W5015-12: W5015-12 had a below average chip quality at Herr Foods (Tables 1-2). The sucrose level declined steadily at both storage temperatures from October through late January 2012, but appeared to be rising in late March 2012 (Figures 17, 19). Glucose levels remained stable during the middle part of the storage season. At the cooler storage temperature, the glucose level remained stable into mid-May (Figure 17). The sucrose levels

did not remain stable for an extended period of time at either temperature, bringing into question the long-term dormancy of this line. W5015-12 appears to have a mid-season dormancy based on the sucrose values recorded.

MSL292-A: This variety was one of the top chip quality performing lines at Herr Foods in December of 2011 and remained above average in the March 19th evaluation (Tables 1-2). MSL292-A appeared to have stable simple sugars and chip quality at the warmer storage temperature into late April 2012 (Figures 23-24). At the cooler storage temperature, there appeared to be some latent sucrose remaining in the tubers during January and February that was metabolized much more slowly at 48 ºF (Figures 21-22). Overall, chip quality was good in this variety late in storage at both storage temperatures.

CO00188-4W: This variety had an average chip quality performance at Herr's, December 2011, and March 2012 (Tables 1-2). Sucrose levels from the 48 ºF samples remained relatively stable season long with consistently low levels of glucose reported late in the storage season (Figure 25). The samples stored at 55 ºF chipped acceptably through late March 2012 (Figures 27-28).

W4980-1: W4980-1 was a marginal performing line at Herr Foods, ranking below average on both processing dates (Tables 1-2). Sucrose levels were stable through April of 2012 at 48 ºF, but the glucose levels were elevated during this same time period, resulting in marginal chip quality after January 2012 (Figures 29-30). The warmer storage temperature appeared to result in a quicker decline in overall chip quality (Figures 31-32).

ND7519-1: ND7519-1 ranked below average on both processing dates at Herr Foods (Tables 1-2). Sucrose levels declined nicely early in the storage season at 48 ºF, with relatively low glucose levels recorded during this same time period, resulting in good chip quality early (Figures 33-34). After late March 2012, sucrose values rose steadily and chip quality declined rapidly. This same trend was apparent at 55 ºF with this process beginning a month earlier (Figures 35-36).

W2978-3: W2978-3 was an average performing line at Herr Foods on both processing dates (Tables 1-2). Sucrose levels were stable throughout the majority of the season at 48 ºF, but the glucose levels were slightly elevated during this same time period, resulting in just average chip quality (Figures 37-38). The variety appeared to have less free glucose at 55 ºF, resulting in slightly better processing quality at the warmer storage temperature (Figures 39-40).

ND8331C5-2: ND8331C5-2 had an average to below average performance at Herr Foods on both processing dates (Tables 1-2). The sucrose values declined nicely in the 55 ºF storage samples while maintaining relatively stable glucose values (Figures 43-44). Chip quality remained good during this same time period. The cooler storage temperature appeared to slow sucrose metabolism in this variety (Figure 41), but did not negatively affect chip quality (Figure 42).

MSJ126-9Y: This variety was ranked average to above average for both processing dates at Herr Foods (Tables 1-2). The 48 ºF storage samples showed the sucrose levels declining from October to late March and remained mostly stable until the end of the 2012 storage season in June (Figure 45). The glucose values during this same time period were low,

resulting in good chip quality (Figure 46). Tuber numbers were limited in the fall of 2011 and only four storage samples were stored at 55 ºF (Figures 47-48).

MSR061-1: This variety was ranked average to above average for both processing dates at Herr Foods (Tables 1-2). The 48 ºF storage samples showed the sucrose levels declining from October to late April, at which time they began to rise steadily to the end of the storage season (Figure 49). Glucose levels and subsequent chip quality was good season long at this storage temperature (Figure 50). MSR061-1 performed well all season long when stored at 55 ºF (Figure 52). The sucrose value remained stable in the warmer storage until late April, at which time dormancy appeared to be lost (Figure 51).

ND8305-1: This variety exhibited poor chip quality performance at Herr Foods on both processing dates (Tables 1-2). Sucrose remained stable or declining into February when stored at 55 ºF, and in late March when stored at 48 ºF (Figures 53, 55). Amazingly, chip quality does not appear to be negatively impacted until later in the storage season (Figures 54, 56).

CO00197-3W: The chip quality performance for this variety was inconsistent at Herr Foods. In December 2011, CO00197-3W ranked in the bottom third of varieties tested and in March of 2012 it ranked in the top third of the variety's evaluated (Tables 1-2). The 48 ºF storage samples showed sucrose stability season long, but the glucose values rose steadily from late December to the end of the storage season, resulting in variable chip quality from the middle to latter part of the storage season (Figures 57-58). Similar results are evident at 55 ºF storage with sugar accumulation being evident earlier in the season as a result of the warmer temperature.

Table 1. 2011-2012 Out-of-Storage Chip Quality, December 8, 2011, Sandyland Farms, LLC [1].

Entry	Agtron Color	SFA[2] Color	Specific Gravity	Percent Chip Defects[3] Internal	External	Total	Comments
NY140	60.8	3.0	1.072	26.6	8.9	35.5	Internals: A few stem/scab on chips. Externals: Good bit of scab. Nice size profile.
W2310-3	63.3	2.0	1.079	9.0	5.1	14.1	Nice chip color. A few scab. Some large and misshapen.
NYE106-4	61.5	3.0	1.082	25.3	7.0	32.3	Some shading in chips. A few scab. Small grade.
Snowden	**62.2**	**3.0**	**1.070**	**7.6**	**11.4**	**19.0**	**Internals: A few stem color. Externals: Some scab. Nice size.**
W5015-12	61.6	3.0	1.075	8.1	35.0	43.1	Internals: Scab showing in chips. External: Lot of heavy scab. Good size profile.
MSL292-A	60.5	2.0	1.066	3.8	13.0	16.8	Nice chip color. Some heavy scab. Good size profile.
CO00188-4W	57.8	4.0	1.061	10.2	10.2	20.4	Some shading in chips. A few scab, green. Small size profile. .
W4980-1	55.2	4.0	1.067	41.7	12.4	54.1	Stem and vascular color. Lot of scab. Nice size.
ND7519-1	61.6	2.0	1.073	10.0	7.3	17.3	A few scab, good skin. Small grade.
W2978-3	65.3	3.0	1.065	18.8	4.3	23.1	A few with shading. Some scab. Small grade.
ND8331C5-2	64.0	4.0	1.072	8.7	15.8	24.5	Some internal net necrosis. Heavy pitted scab. Small grade.
MSJ126-9Y	63.5	3.0	1.064	26.2	3.0	29.2	Some light stem and vascular. A few scab. Nice size.
MSR061-1	60.8	3.0	1.068	12.6	8.7	21.3	Good chip color. Some heavy pitted scab. Small grade.
ND8305-1	60.1	4.0	1.079	1.3	33.3	34.6	Internals: Scab showing on chips. Externals: Heavy scab. Small grade.
CO00197-3W	61.5	3.0	1.067	15.2	11.6	26.8	A few stem color. Heavy scab. Small grade.

[1] Samples removed from 57 ºF storage and processed by Herr Foods Inc., Nottingham, PA on December 8, 2011.
Chip defects are included in Agtron and SFA samples.

[2] SFA Color: 1= lightest, 5 = darkest

[3] Percent Chip Defects are a percentage by weight of the total sample; comprised of undesirable color, greening, internal defects and external defects.

Table 2. 2011-2012 Out-of-Storage Chip Quality, March 19, 2012, Sandyland Farms, LLC [1].

Entry	Agtron Color	SFA[2] Color	Specific Gravity	Percent Chip Defects[3] Internal	External	Total	Comments
NY140	58.0	3.0	1.078	10.8	16.1	26.9	Internals: Some vascular, brown spot. Externals: A few bruise, green. Good size profile.
W2310-3	54.5	4.0	1.085	23.2	9.2	32.4	Internals: Light shading and pressure bruise. Externals: Nice skin, no scab. Large oblong.
NYE106-4	57.2	3.0	1.087	15.1	9.3	24.4	Internals: Nice chip color. Externals: Some bruise, no scab. Nice size.
Snowden	**59.8**	**2.0**	**1.074**	**3.9**	**9.4**	**13.3**	**Internals: Good chip color. Externals: A few scab. Pretty nice. Good size.**
W5015-12	51.2	4.0	1.081	4.0	27.1	31.1	Internals: Defects affect appearance, chip color otherwise ok. Externals: Surface defects, pitted scab. Small grade.
MSL292-A	61.1	4.0	1.061	7.8	27.7	35.5	Internals: A few light shading. Externals: Green, scab. Small grade.
CO00188-4W	53.3	3.0	1.073	4.3	7.4	11.7	Internals: Good chip color. Externals: Nice skin, no scab. Good size.
W4980-1	56.1	4.0	1.070	21.5	10.1	31.6	Internals: Stem end color. Externals: A few scab. Good size.
ND7519-1	58.0	5.0	1.076	27.3	11.3	38.6	Internals: Color in chips. Externals: Light scab. Small size.
W2978-3	57.7	4.0	1.065	15.6	16.2	31.8	Internals: Color in chips. Externals: Scab, bruise, defects. Small grade.
ND8331C5-2	52.7	3.0	1.075	10.5	14.2	24.7	Internals: Some chip color. Externals: Scab, edge defects. Small grade.
MSJ126-9Y	59.6	3.0	1.066	10.8	5.4	16.2	Internals: Good chip color. Externals: Nice skin, a few green. Yellow flesh.
MSR061-1	56.4	3.0	1.079	15.9	7.9	23.8	Internals: A few light stem end. Externals: Just a few scab. Good size profile.
ND8305-1	49.6	4.0	1.082	16.4	51.0	67.4	Internals: HH. Externals: Scab, bruise defects. Small grade.
CO00197-3W	57.1	3.0	1.074	7.6	17.5	25.1	Internals: Good chip color. Externals: Bruise and scab. Surface defects on chips. Small grade.

[1] Samples removed from 55 ºF storage and processed by Herr Foods Inc., Nottingham, PA on March 19, 2012.
Chip defects are included in Agtron and SFA samples.

[2] SFA Color: 1= lightest, 5 = darkest

[3] Percent Chip Defects are a percentage by weight of the total sample; comprised of undesirable color, greening, internal defects and external defects.

Figure 1.

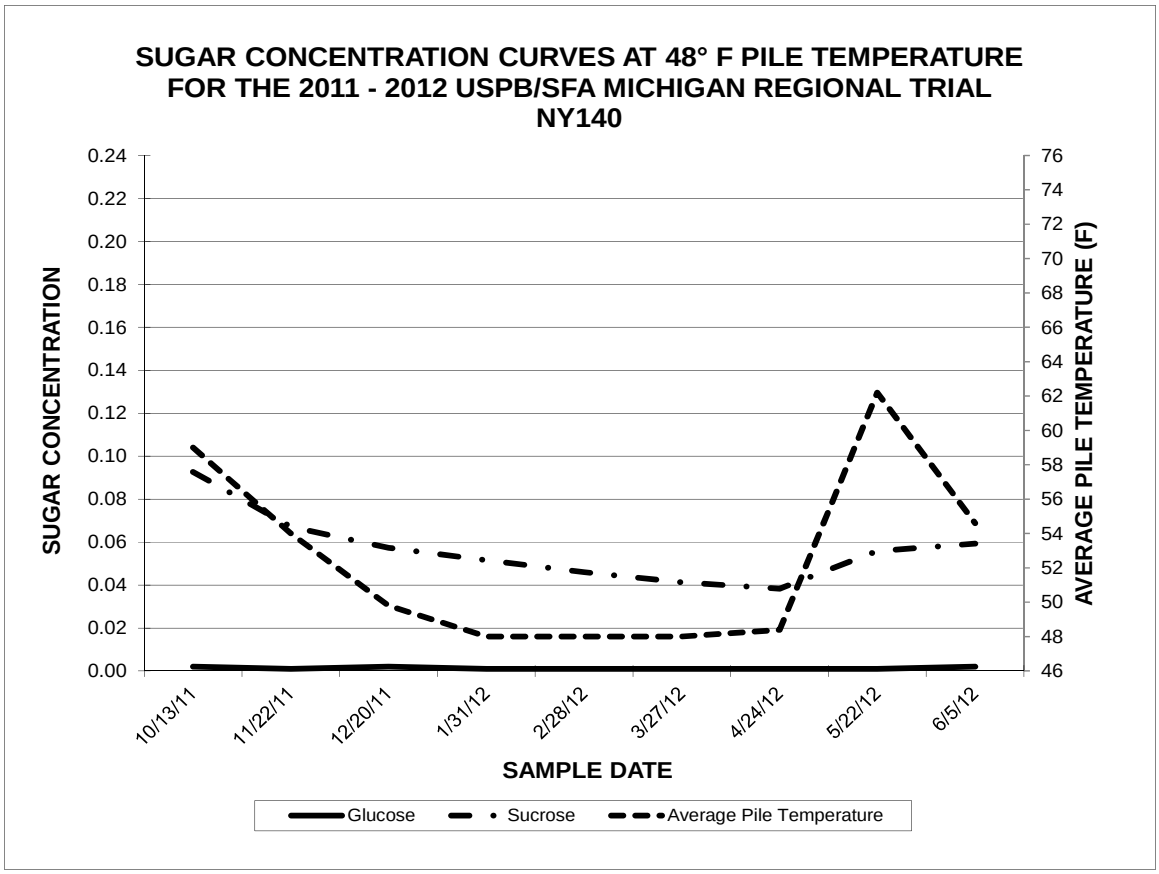

Figure 2.

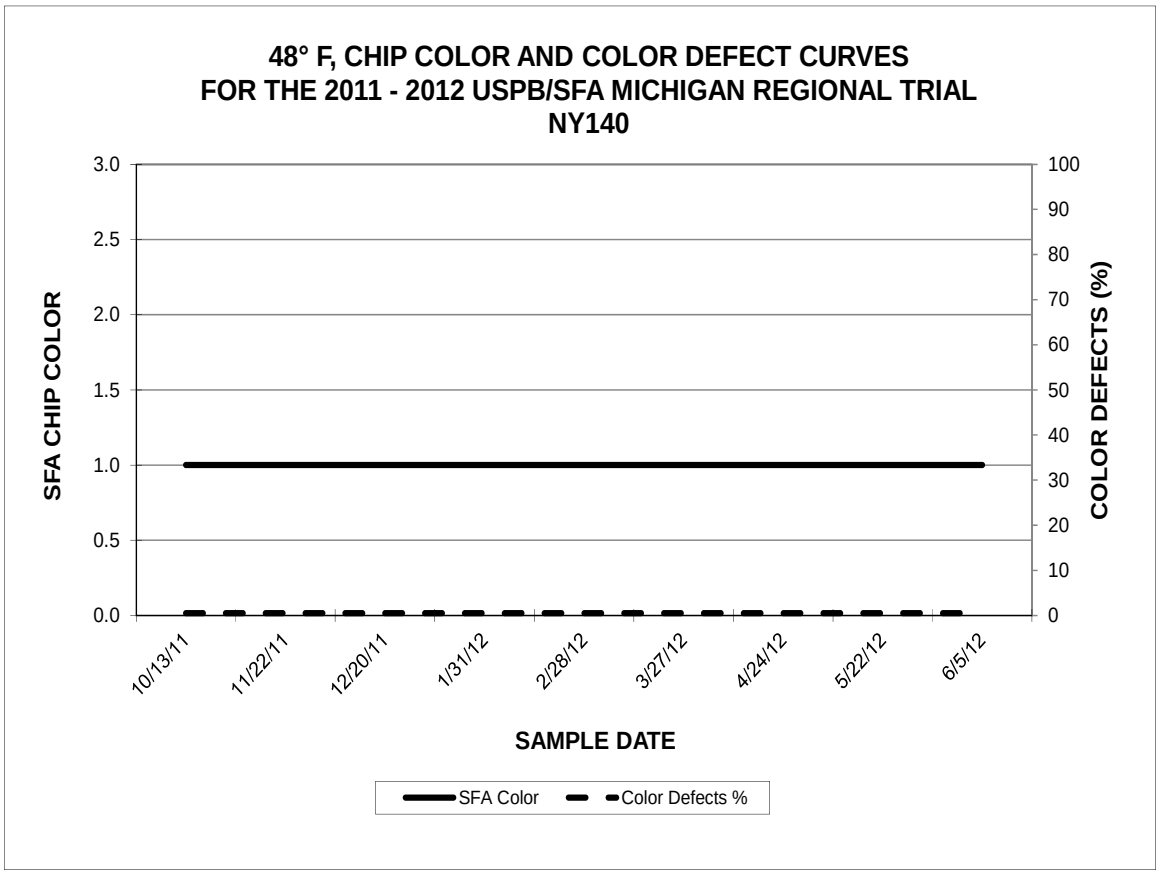

Figure 3.

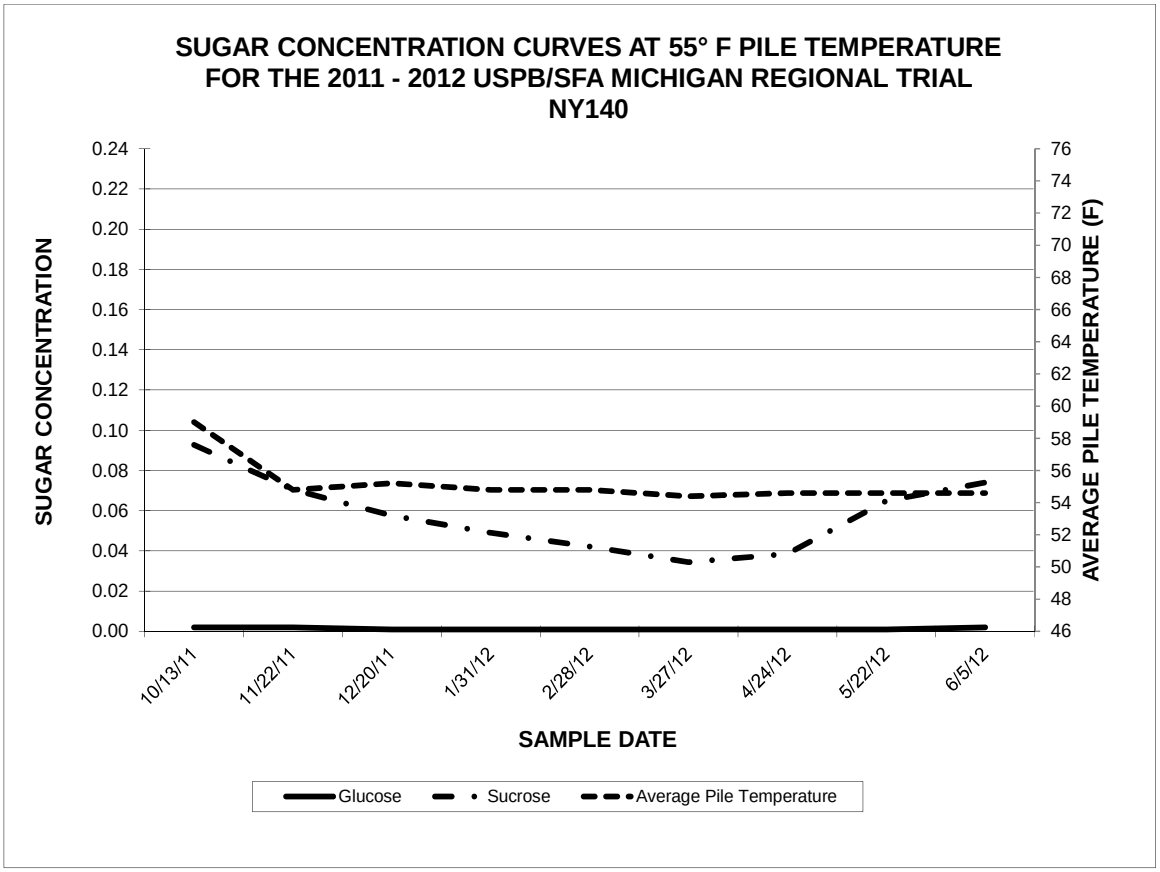

Figure 4.

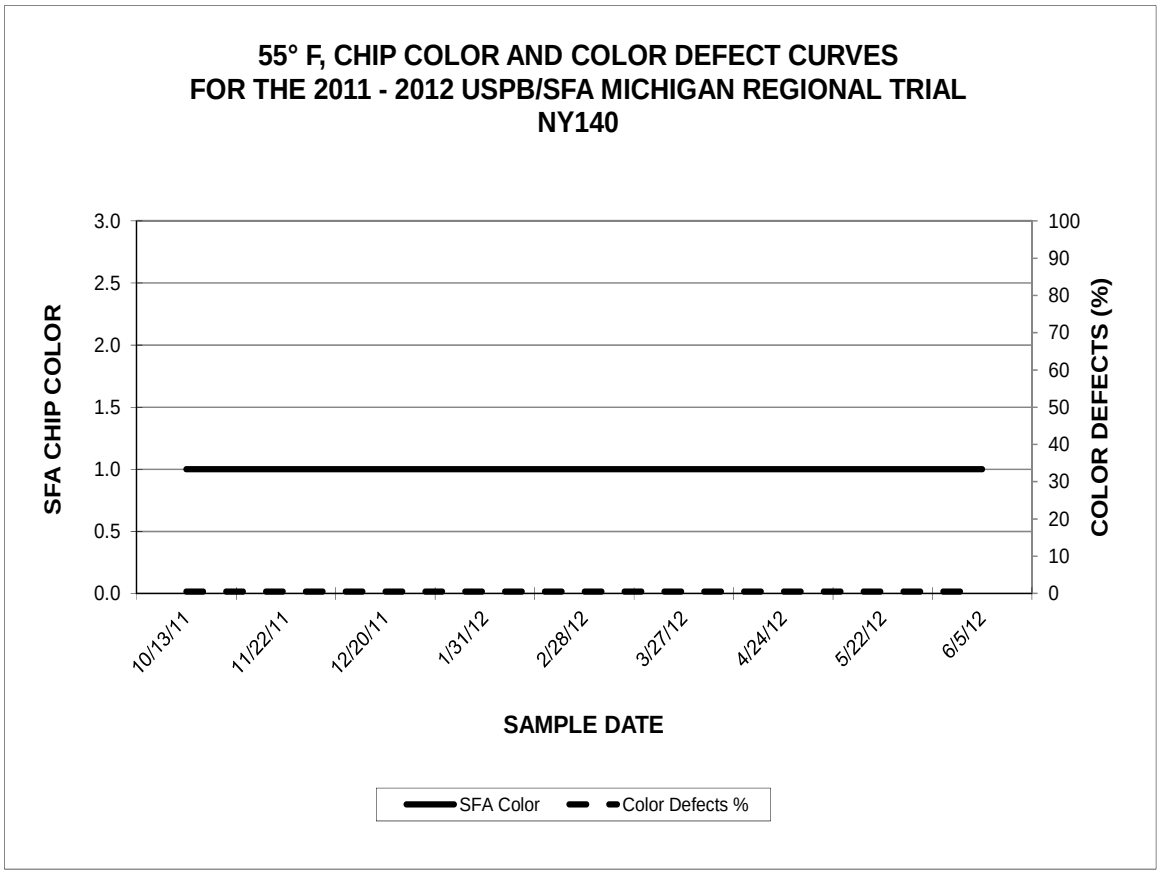

Figure 5.

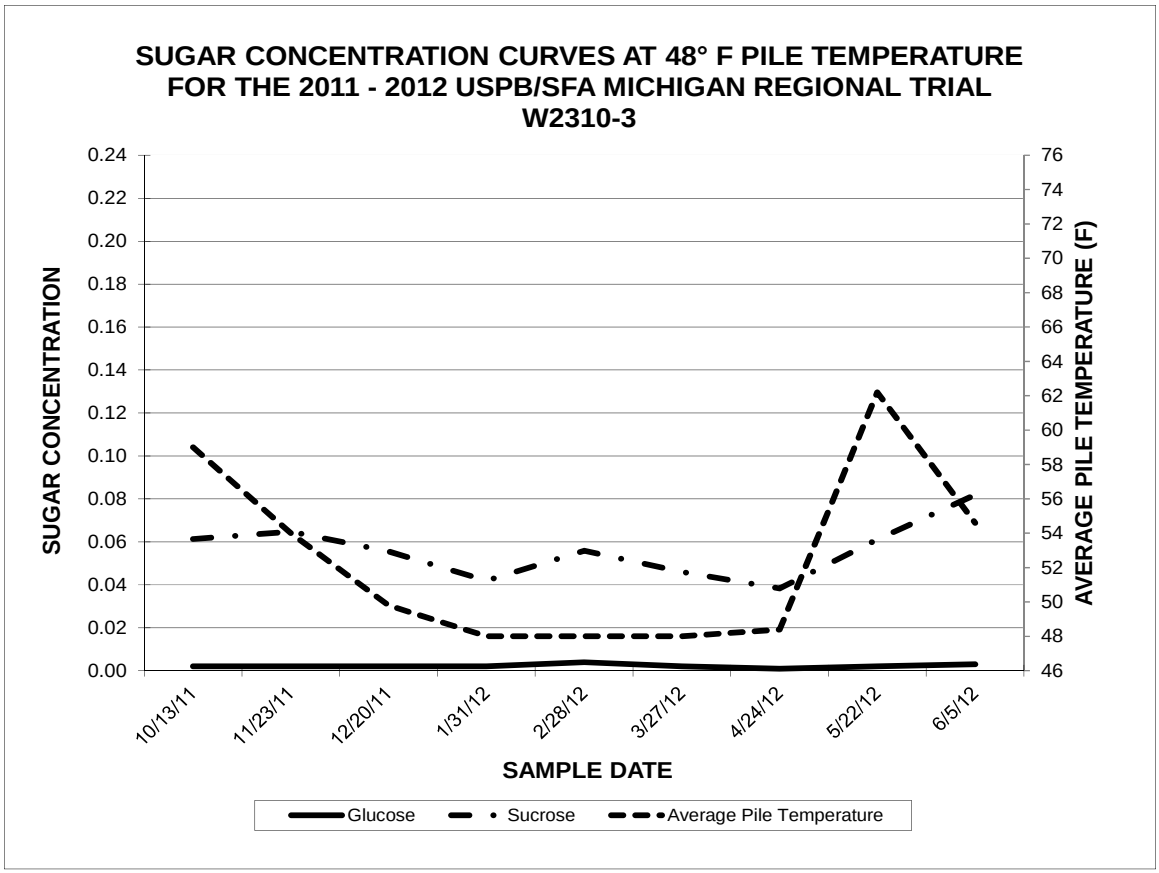

Figure 6.

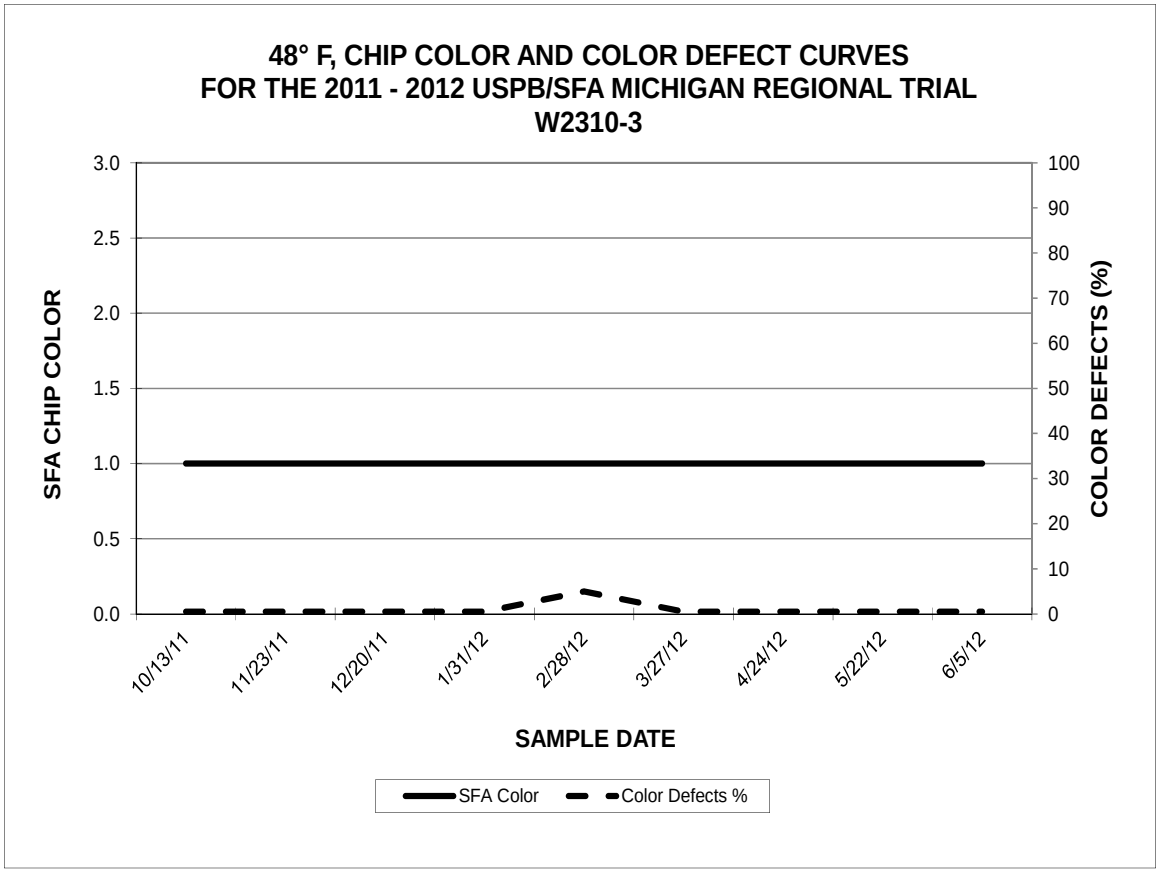

Figure 7.

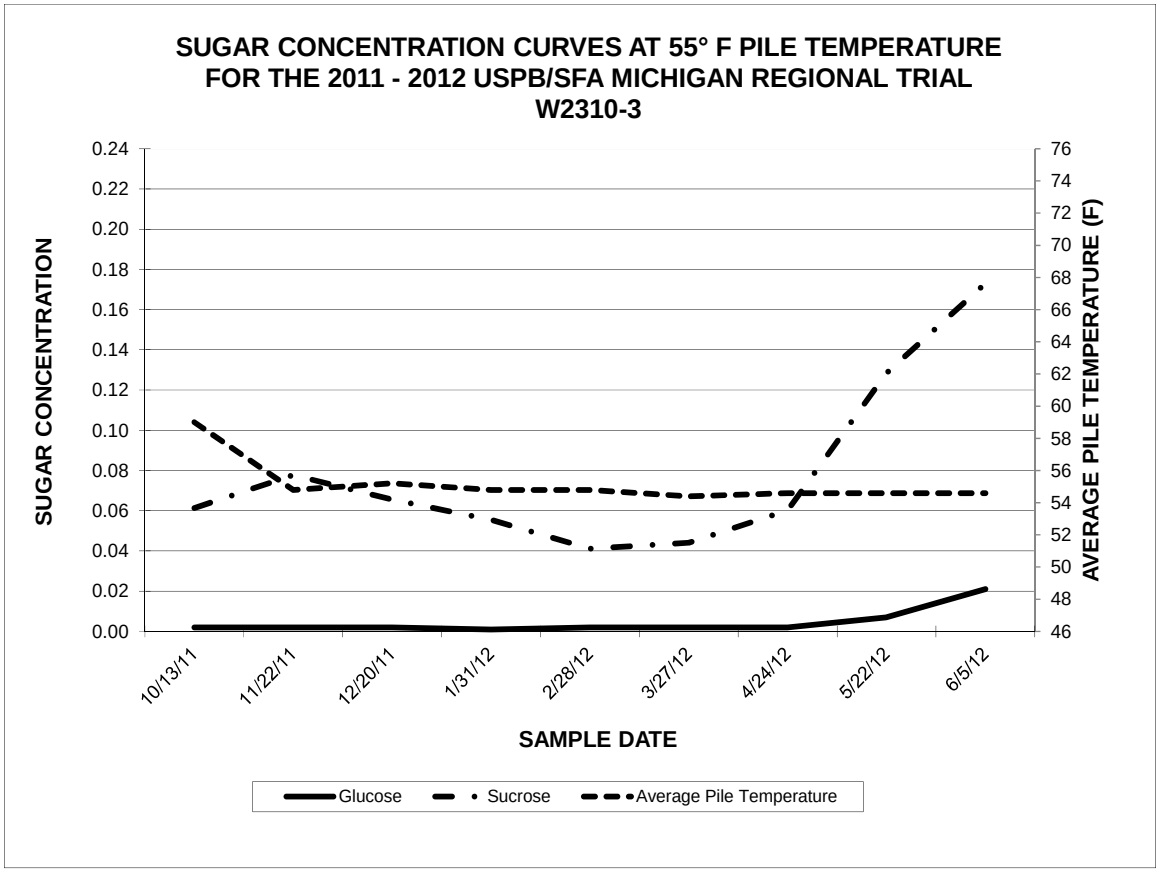

Figure 8.

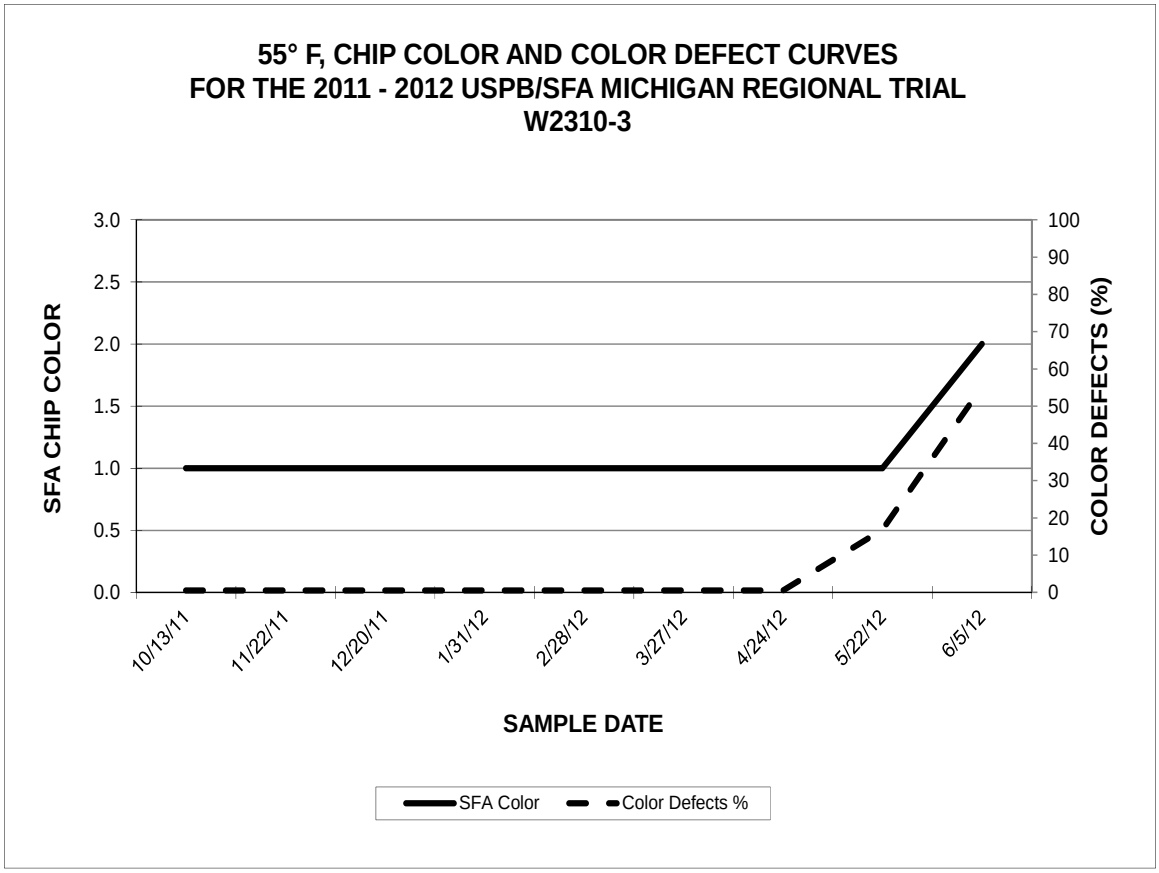

Figure 9.

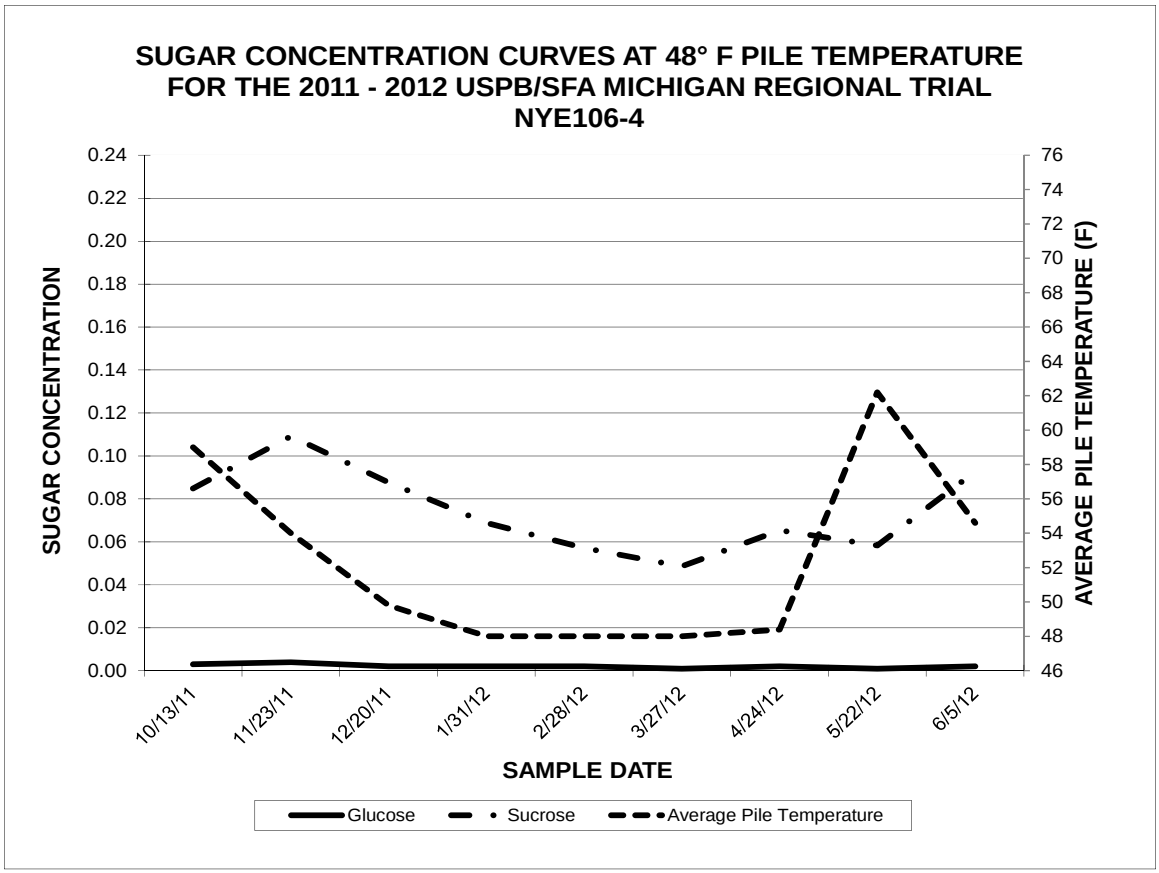

Figure 10.

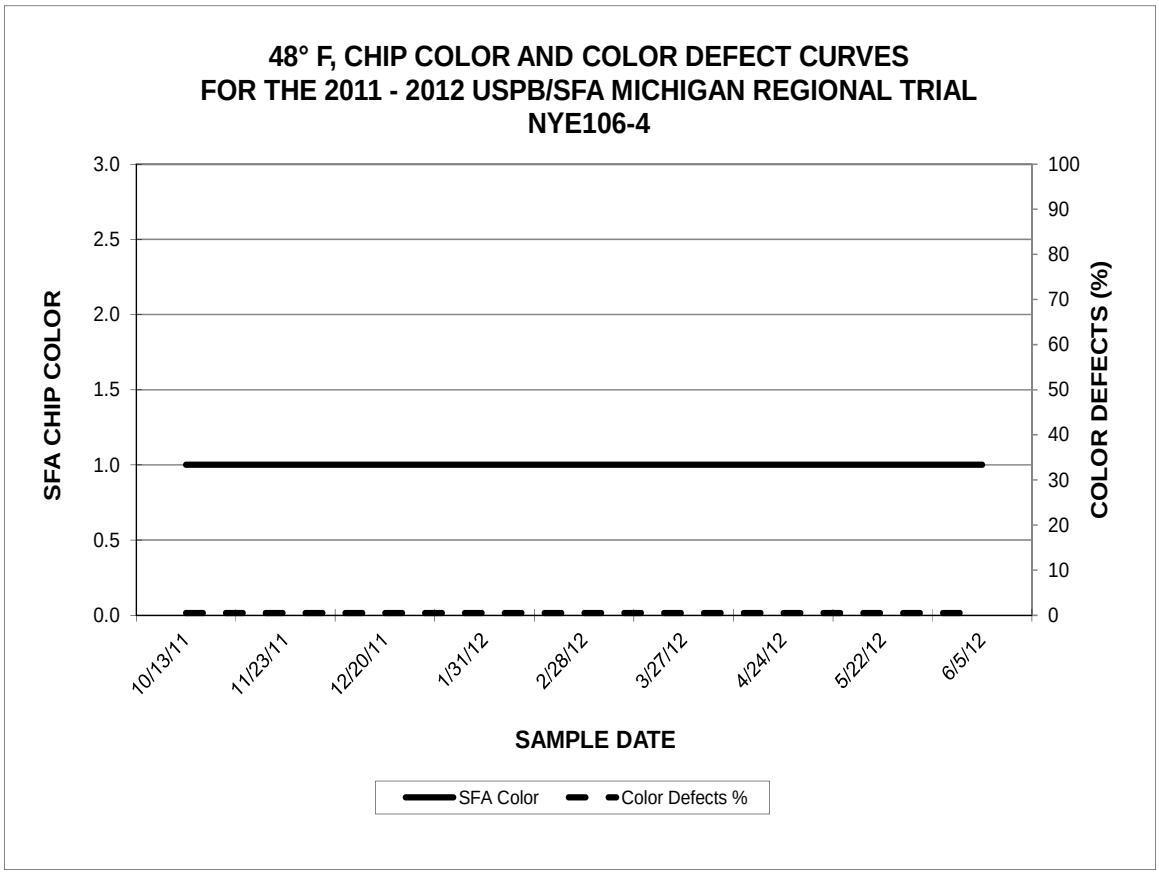

Figure 11.

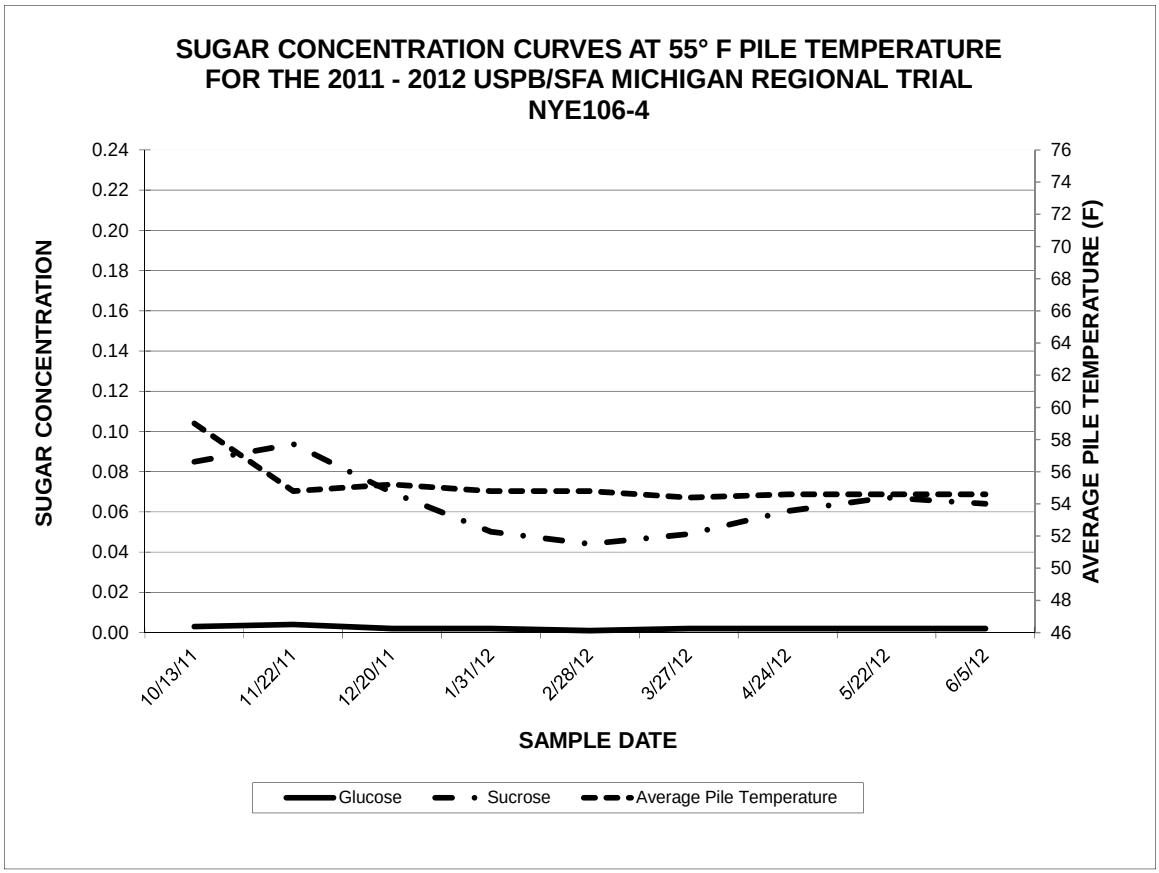

Figure 12.

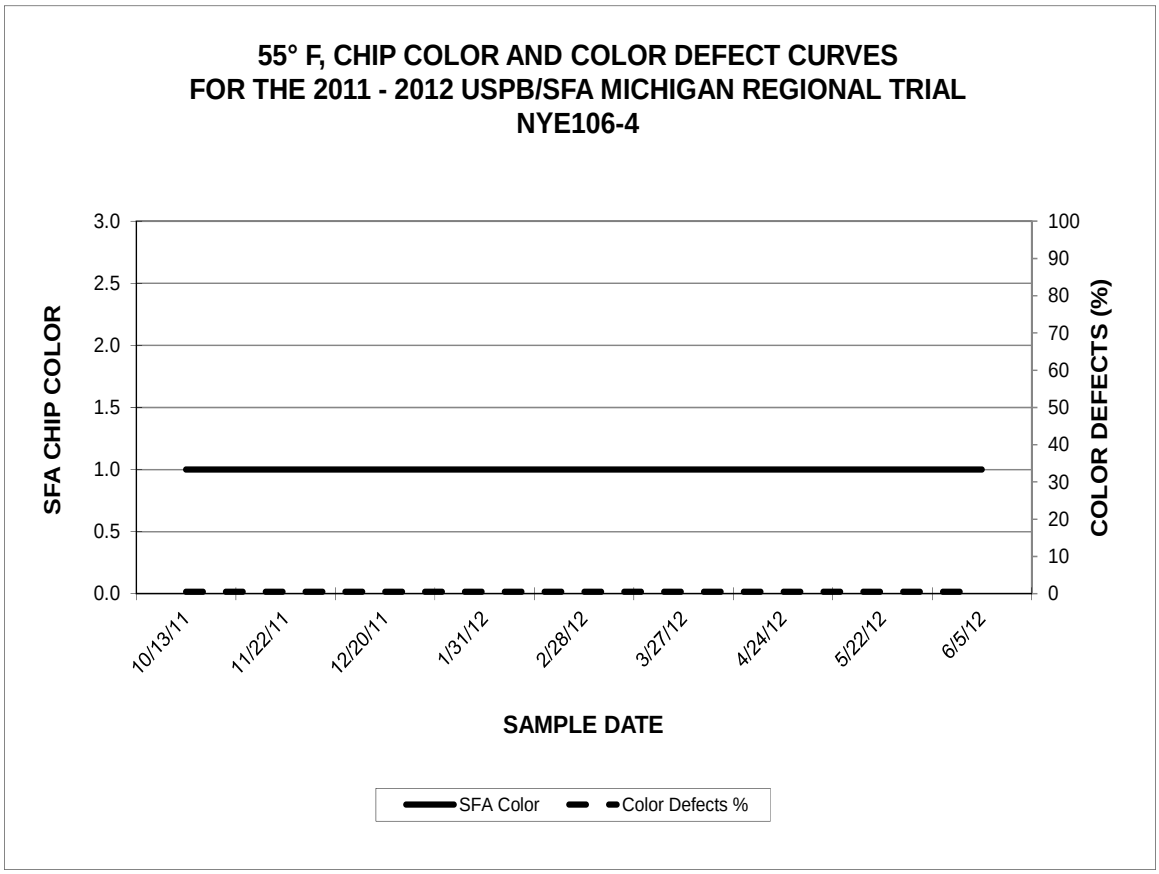

Figure 13.

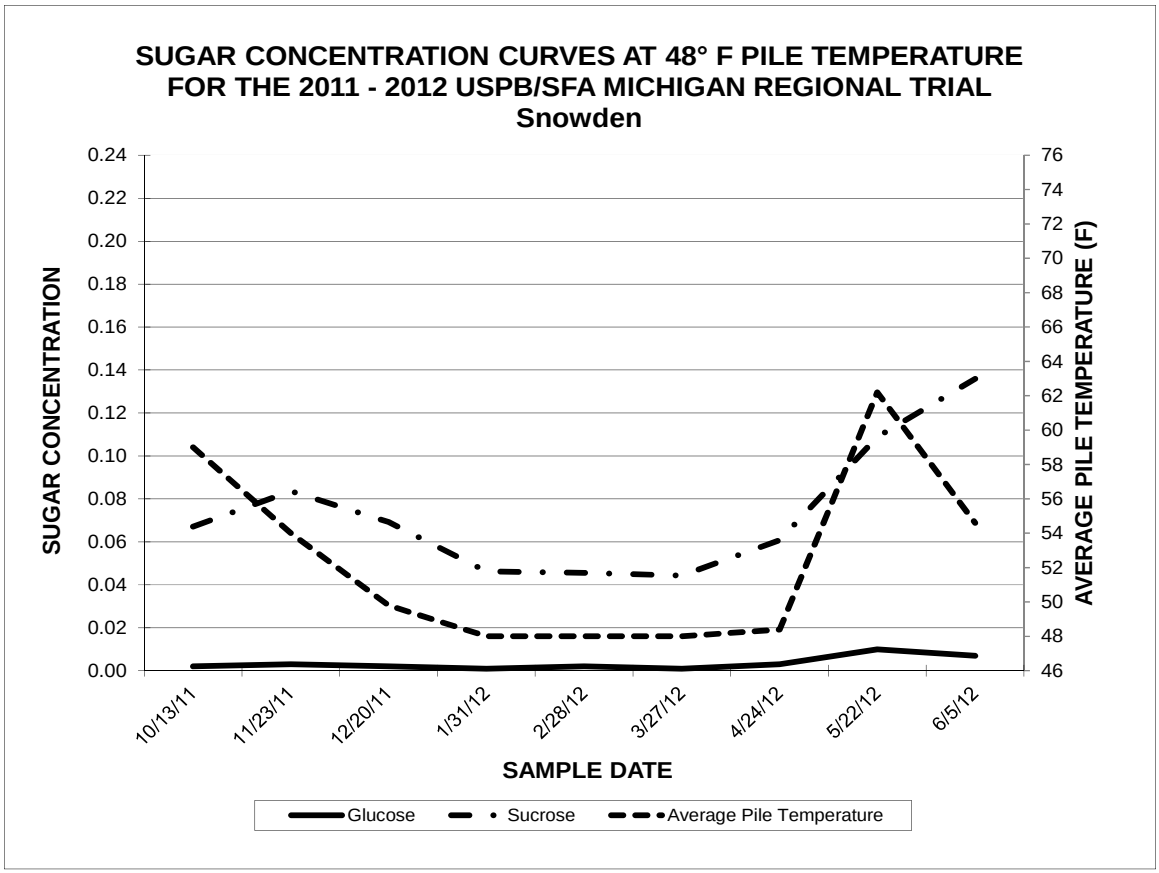

Figure 14.

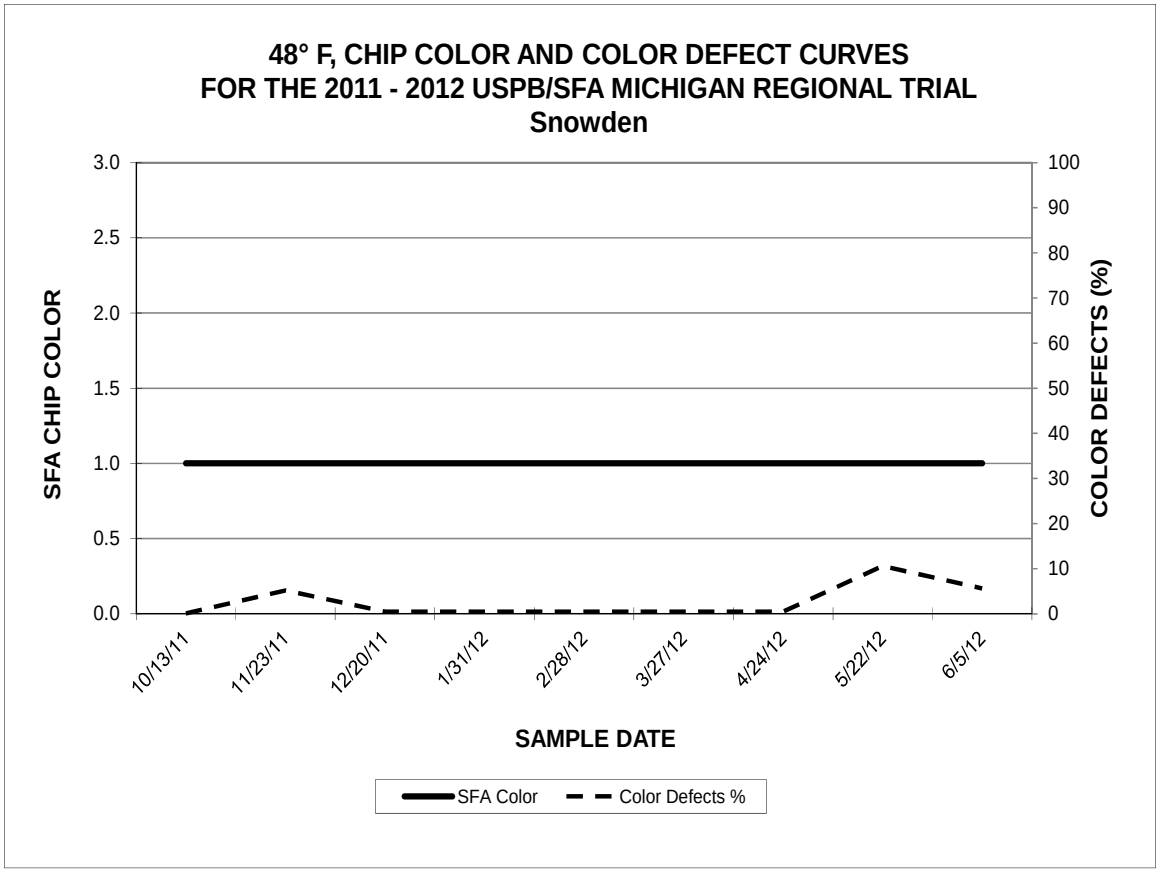

Figure 15.

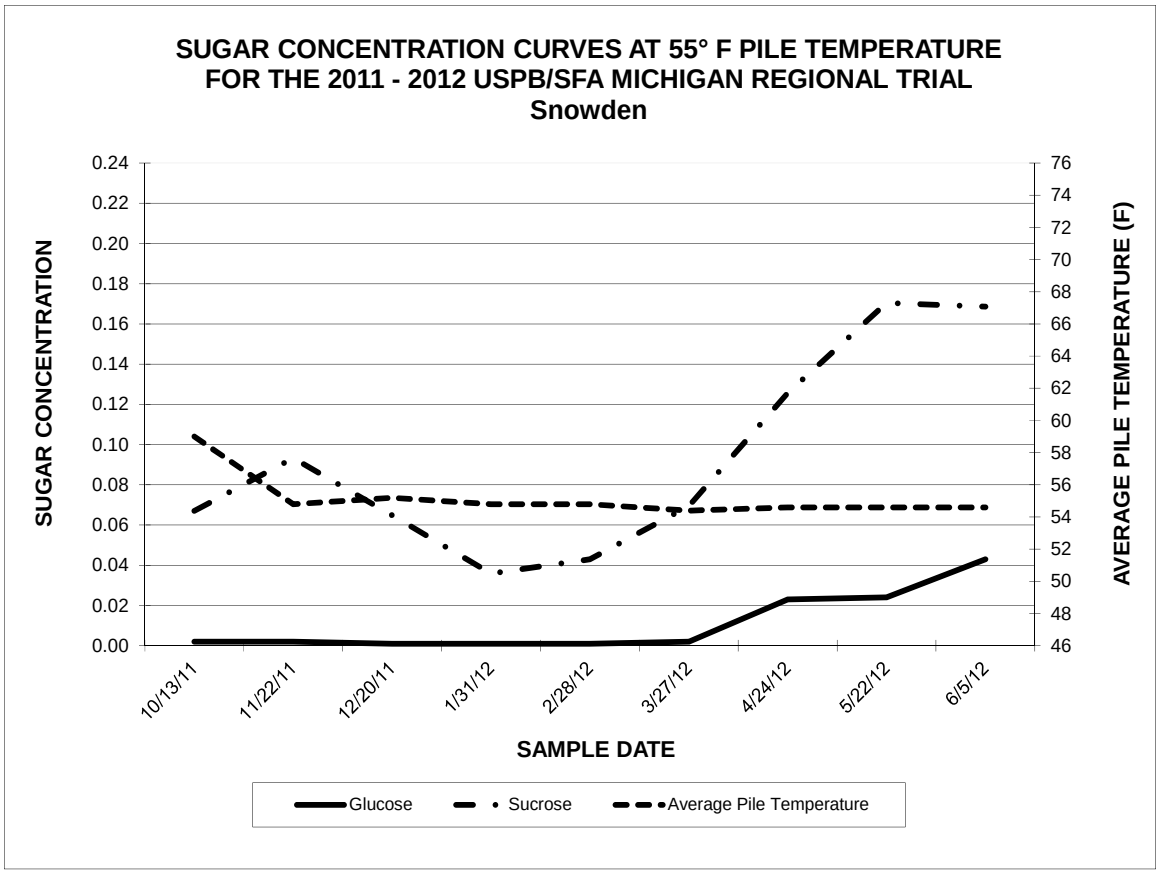

Figure 16.

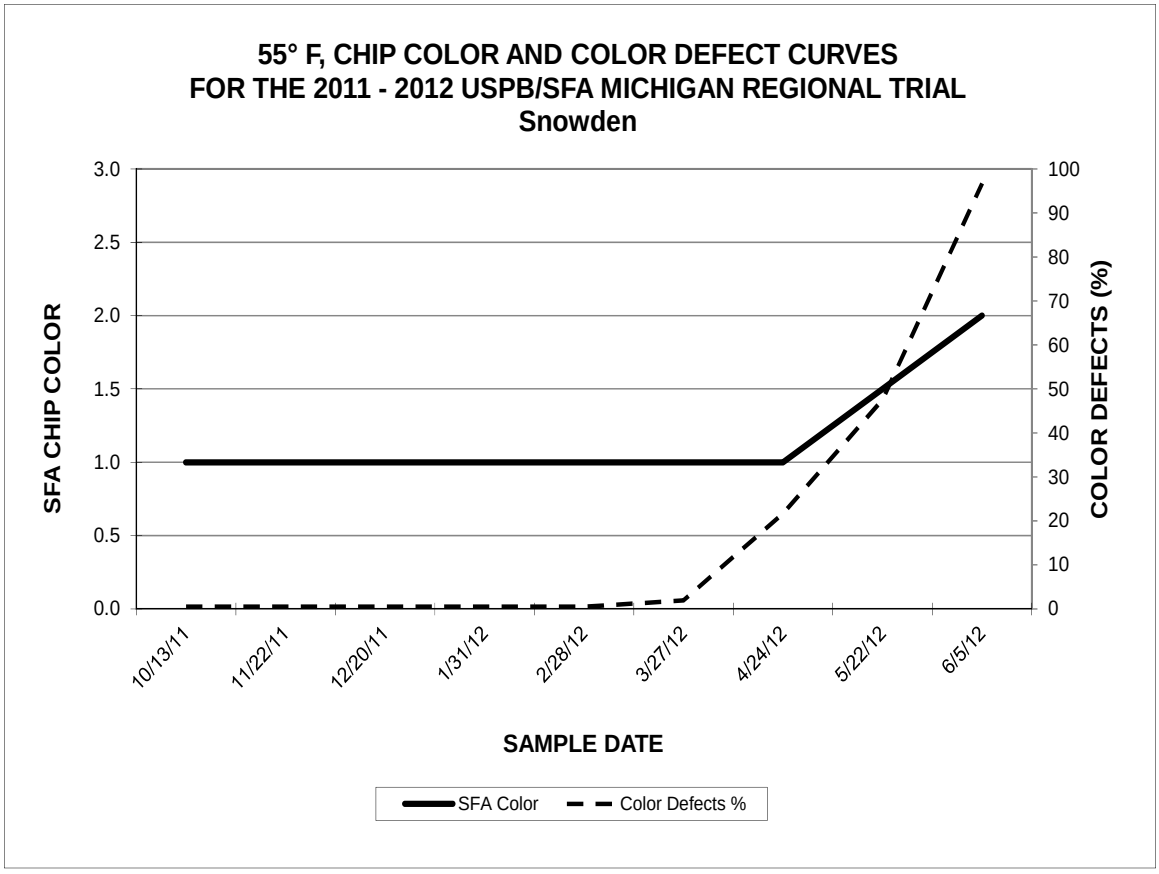

Figure 17.

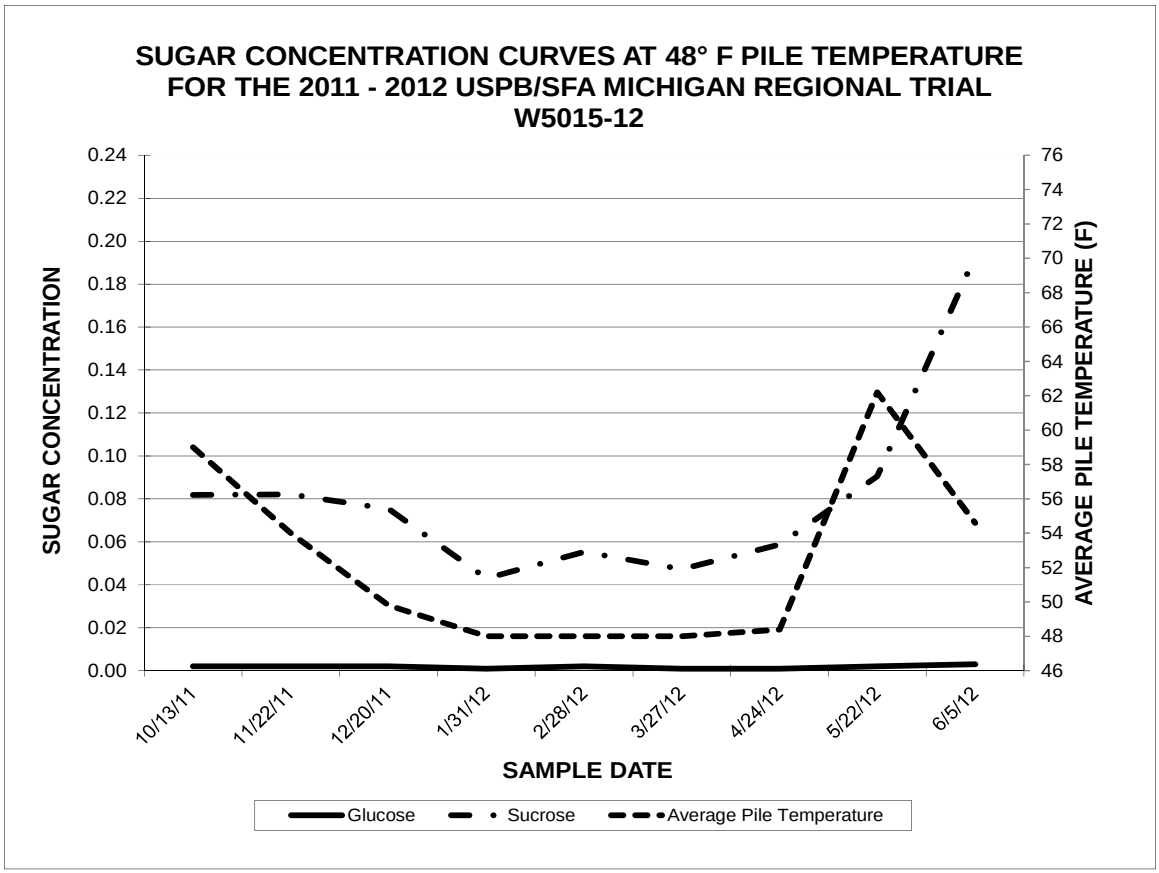

Figure 18.

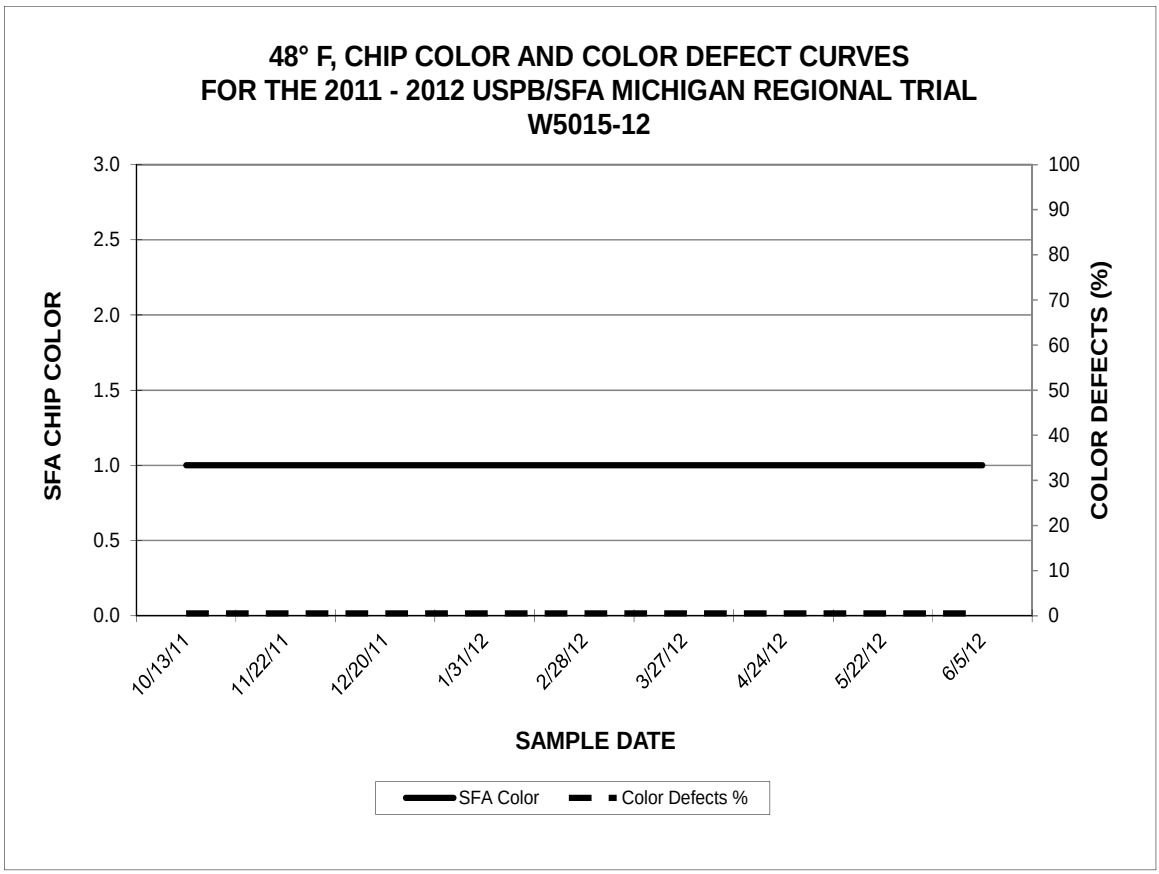

Figure 19.

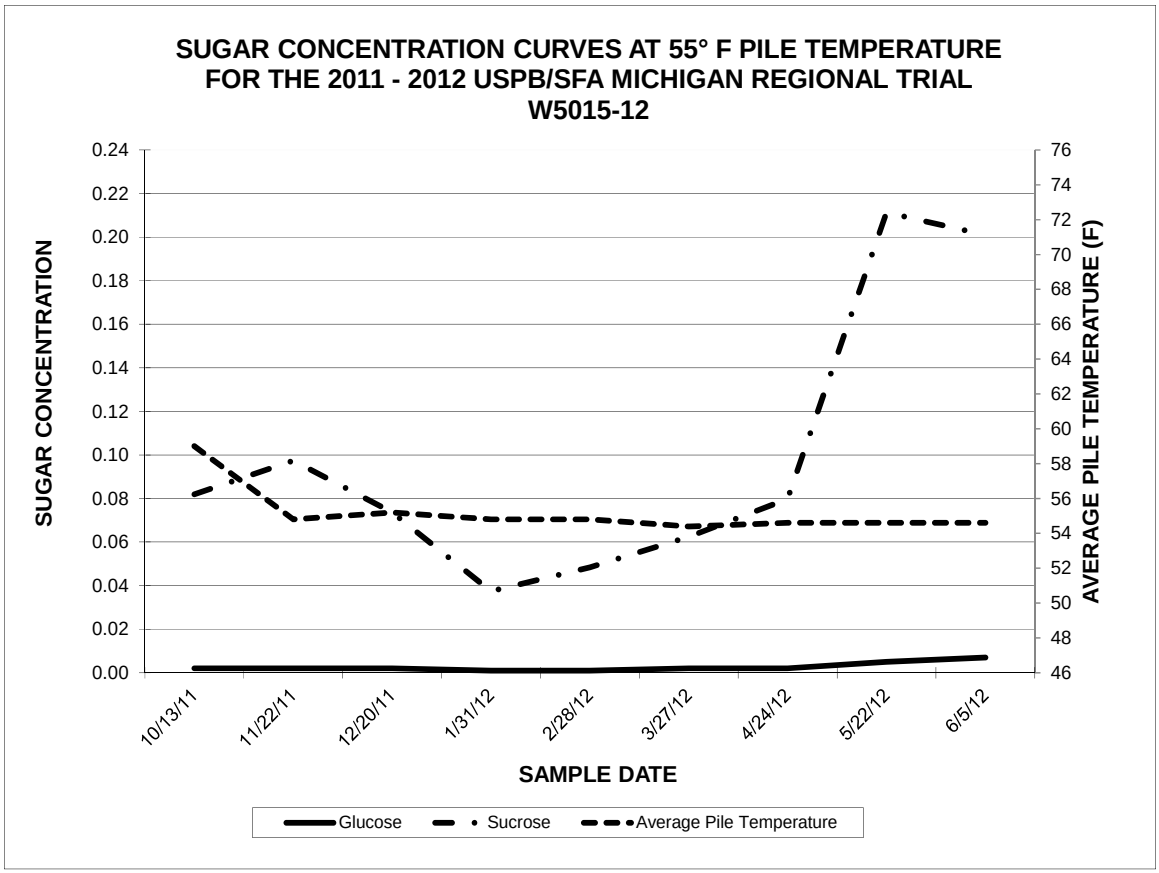

Figure 20.

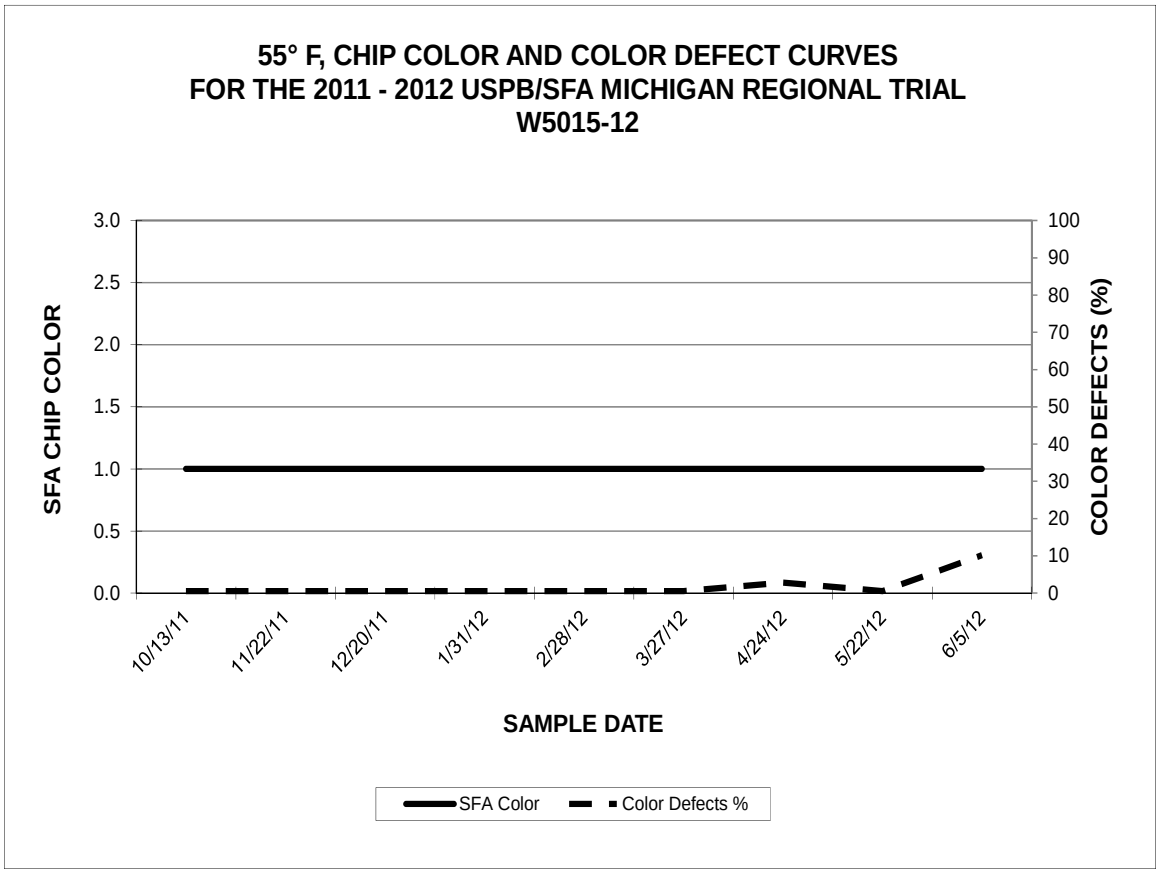

Figure 21.

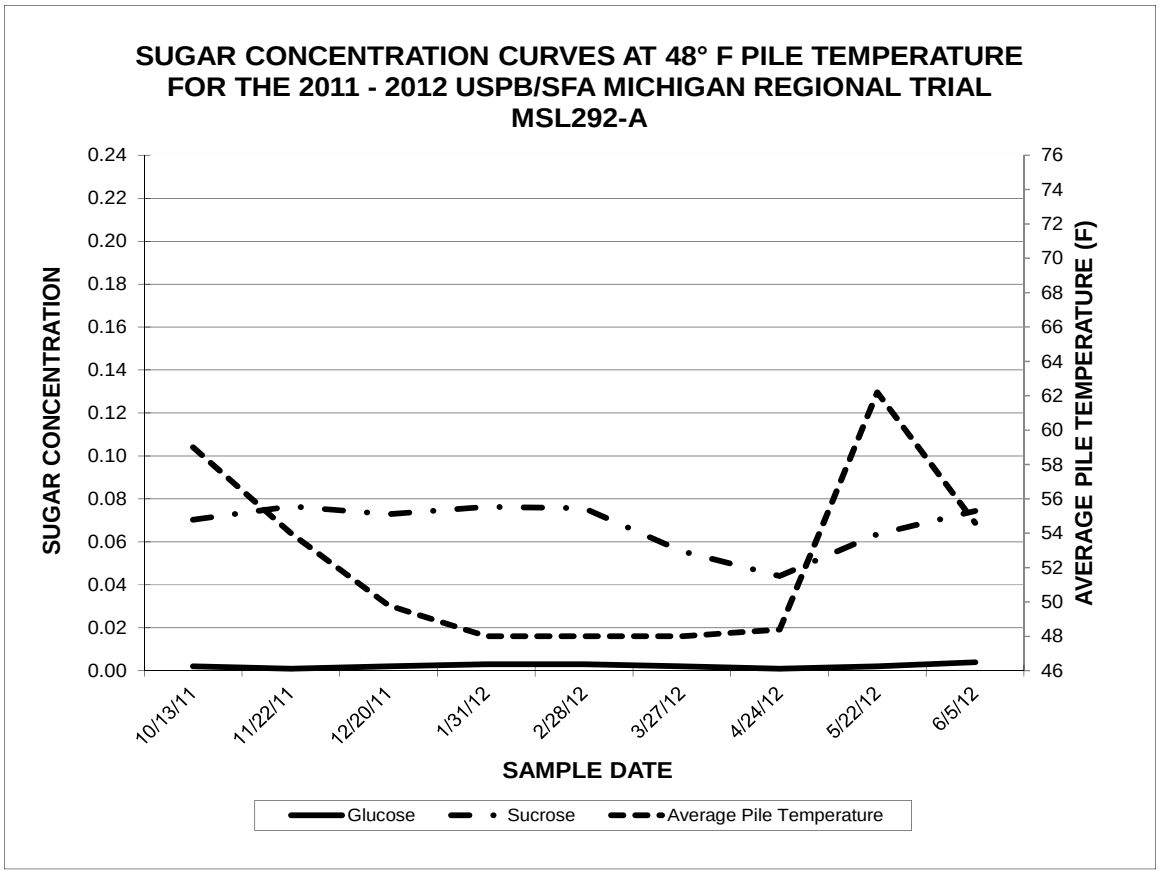

Figure 22.

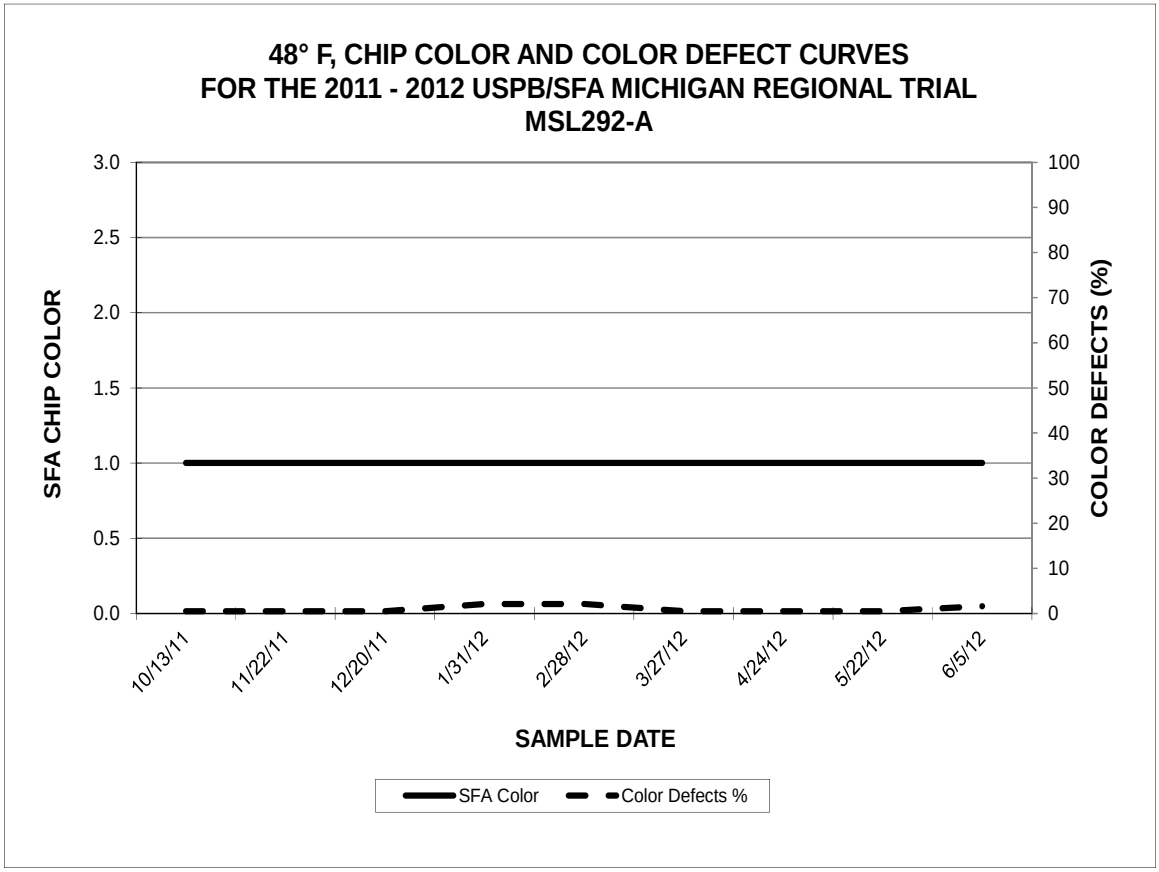

Figure 23.

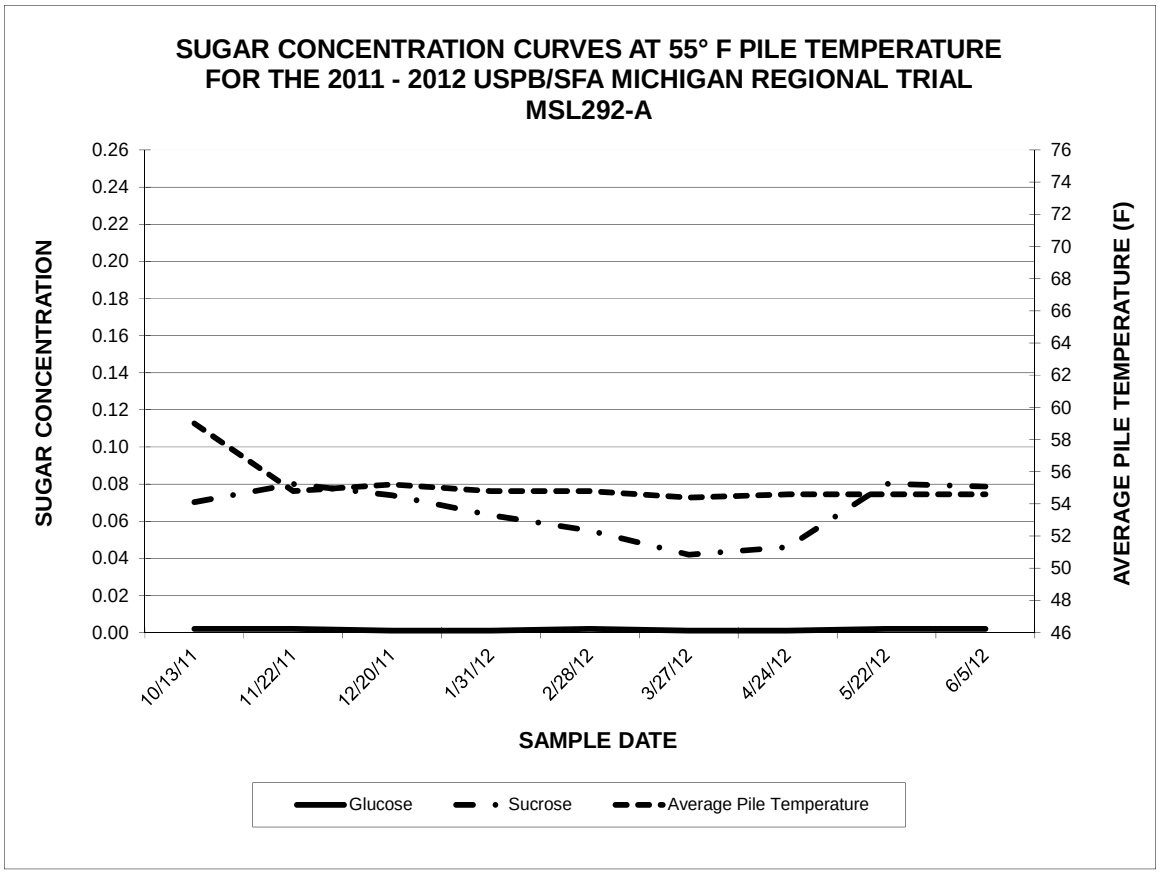

Figure 24.

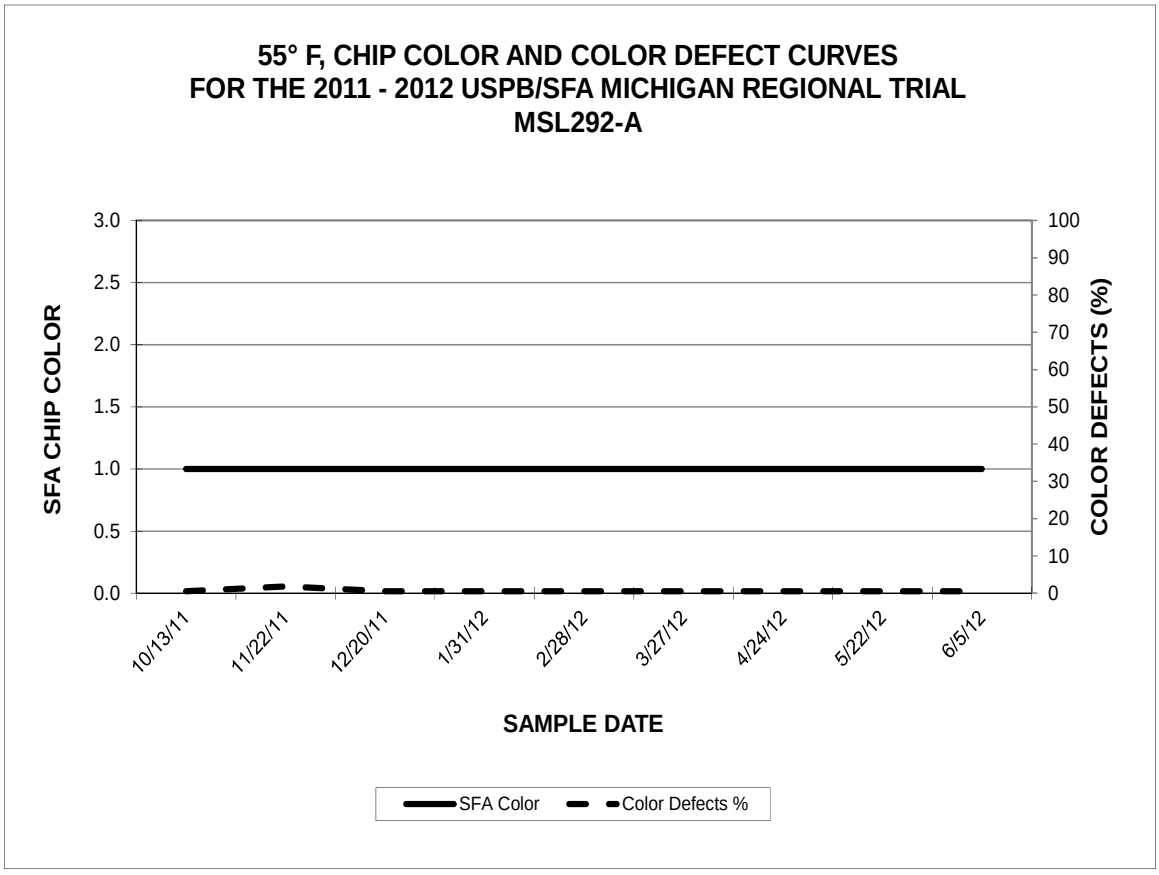

Figure 25.

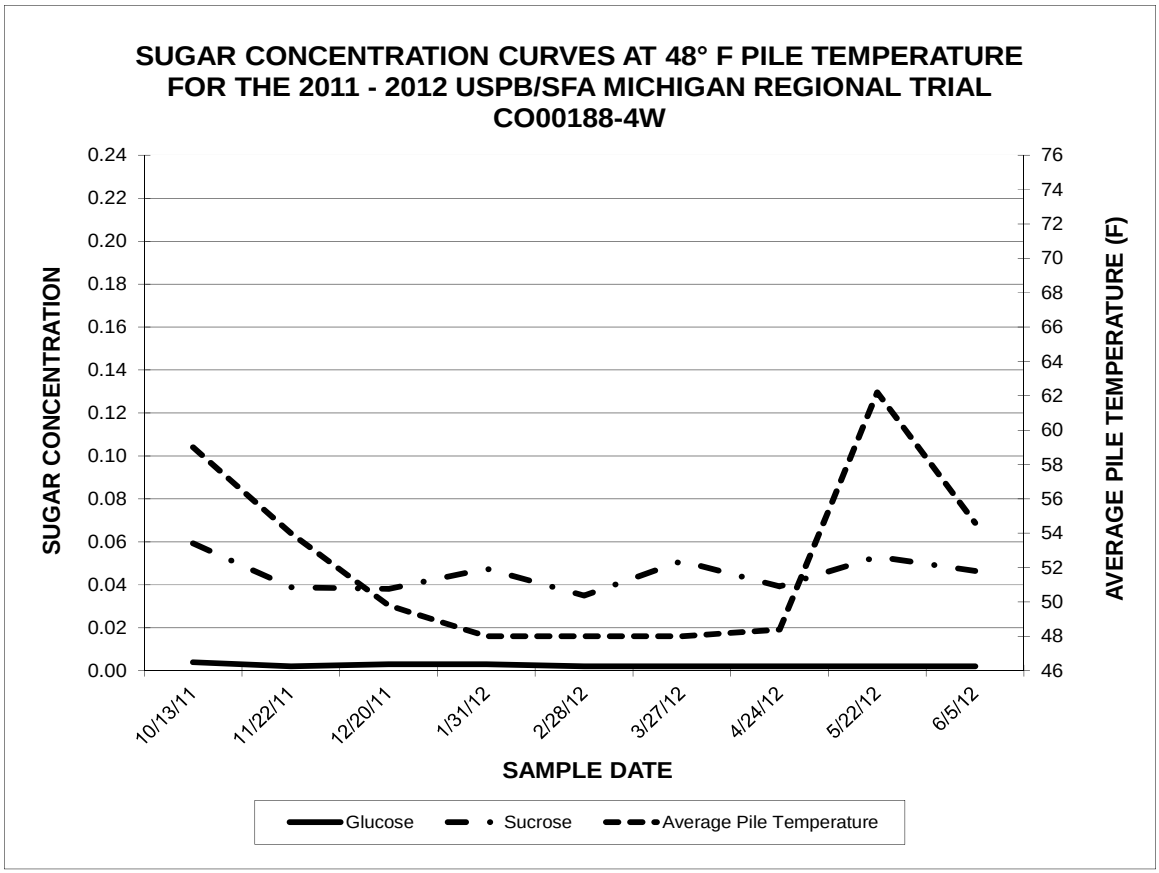

Figure 26.

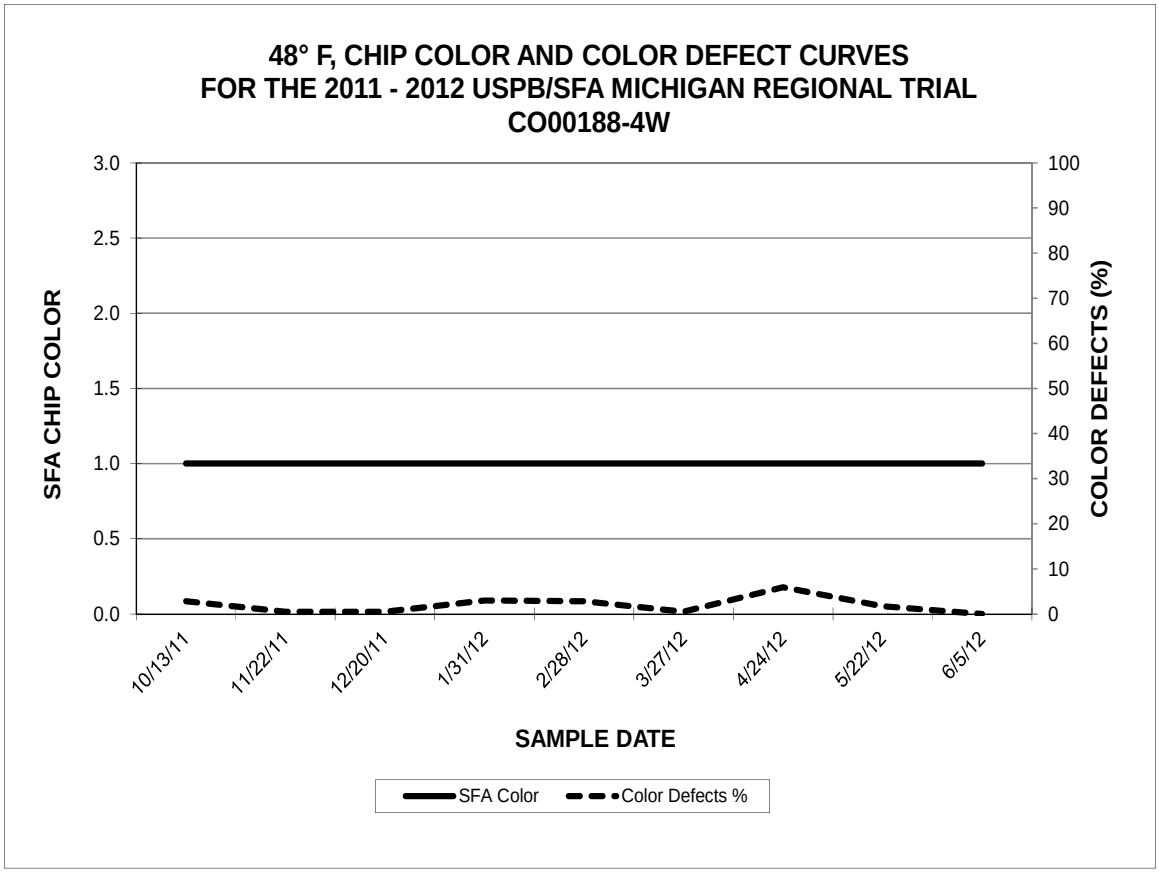

Figure 27.

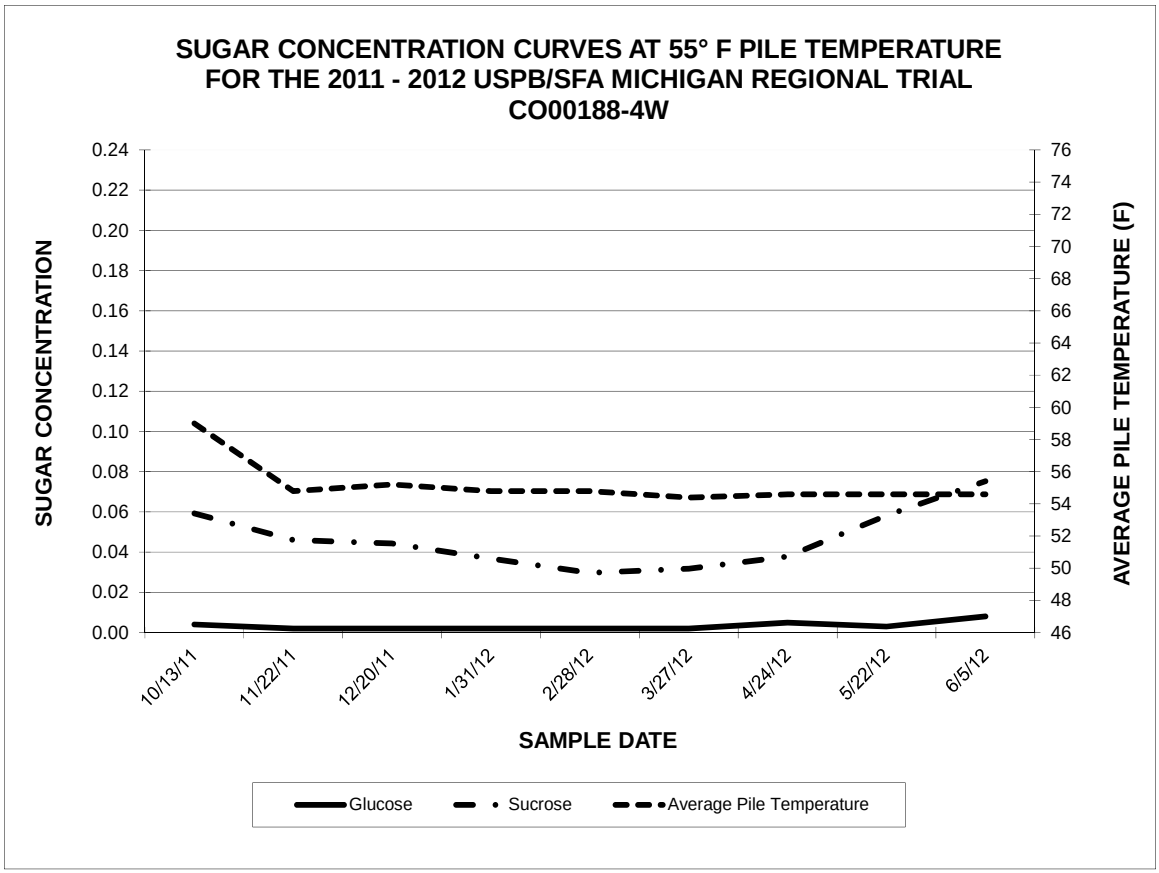

Figure 28.

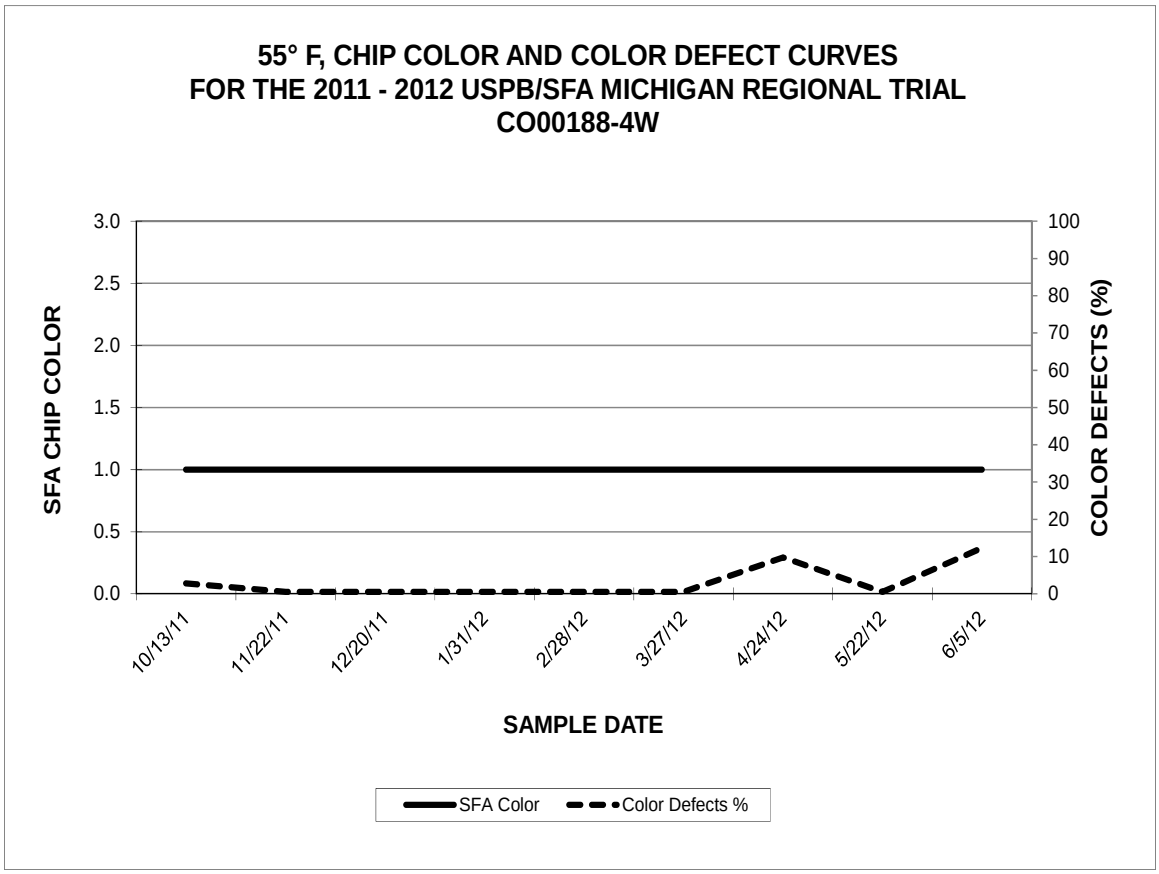

Figure 29.

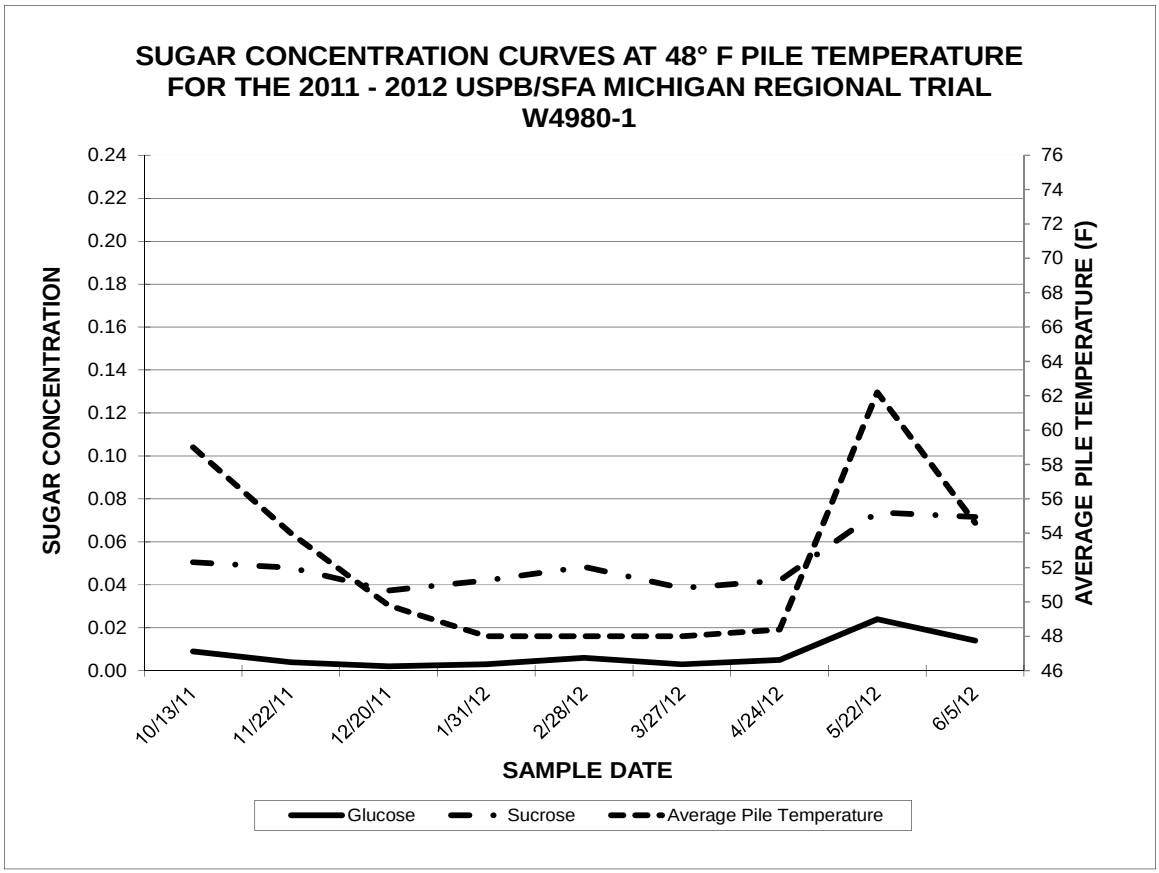

Figure 30.

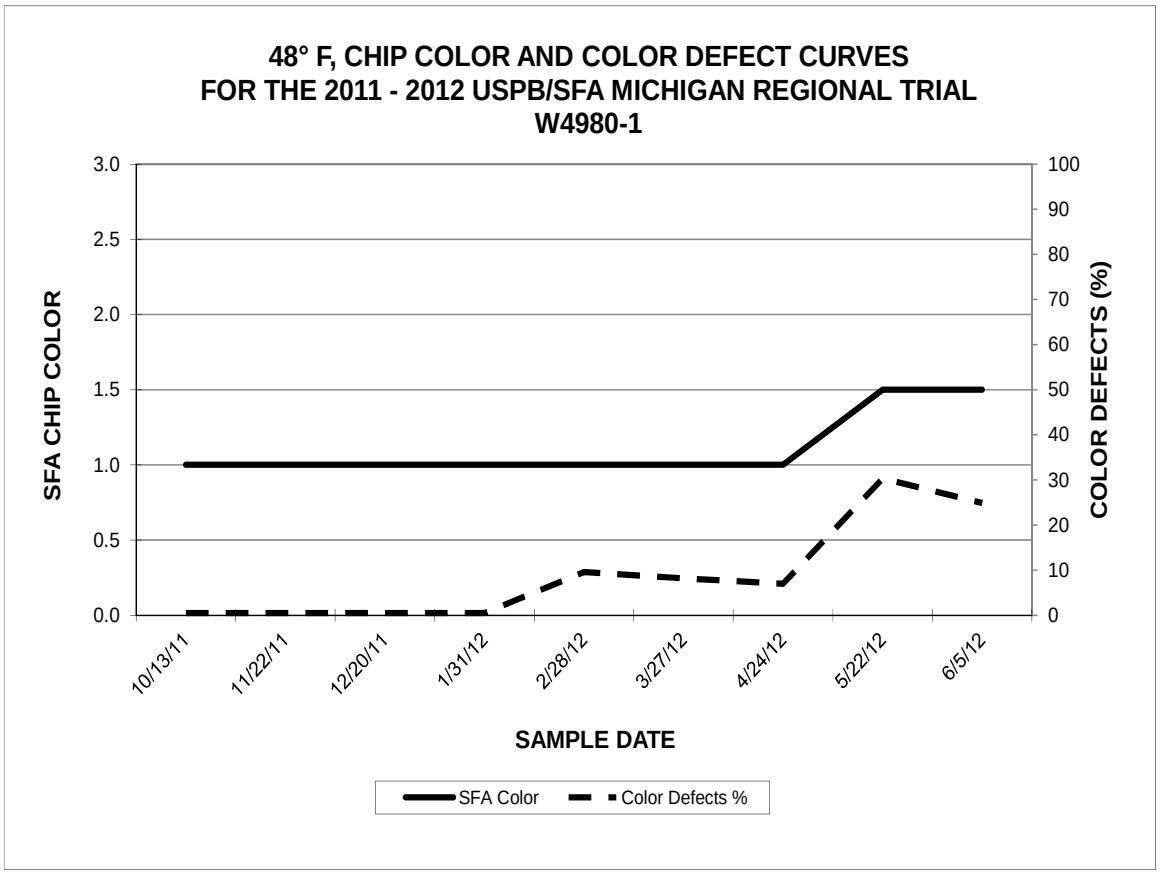

Figure 31.

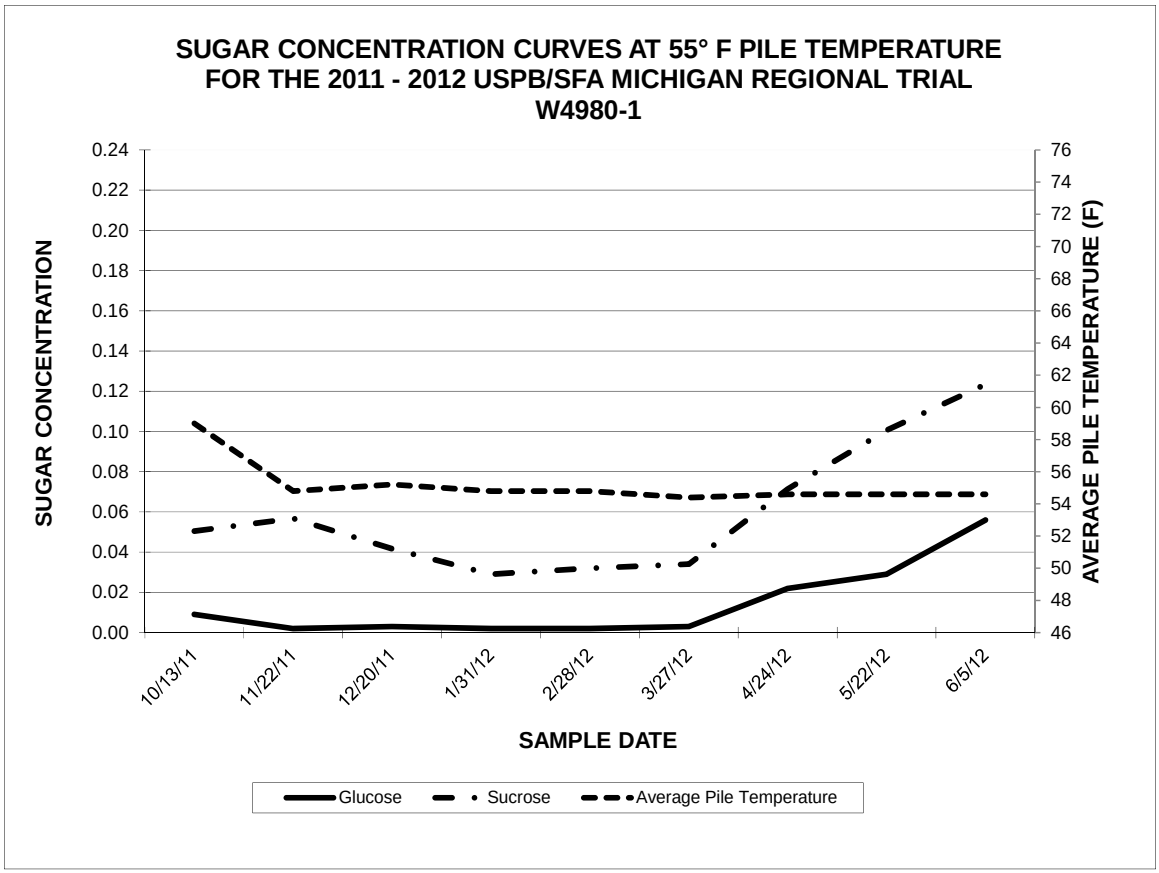

Figure 32.

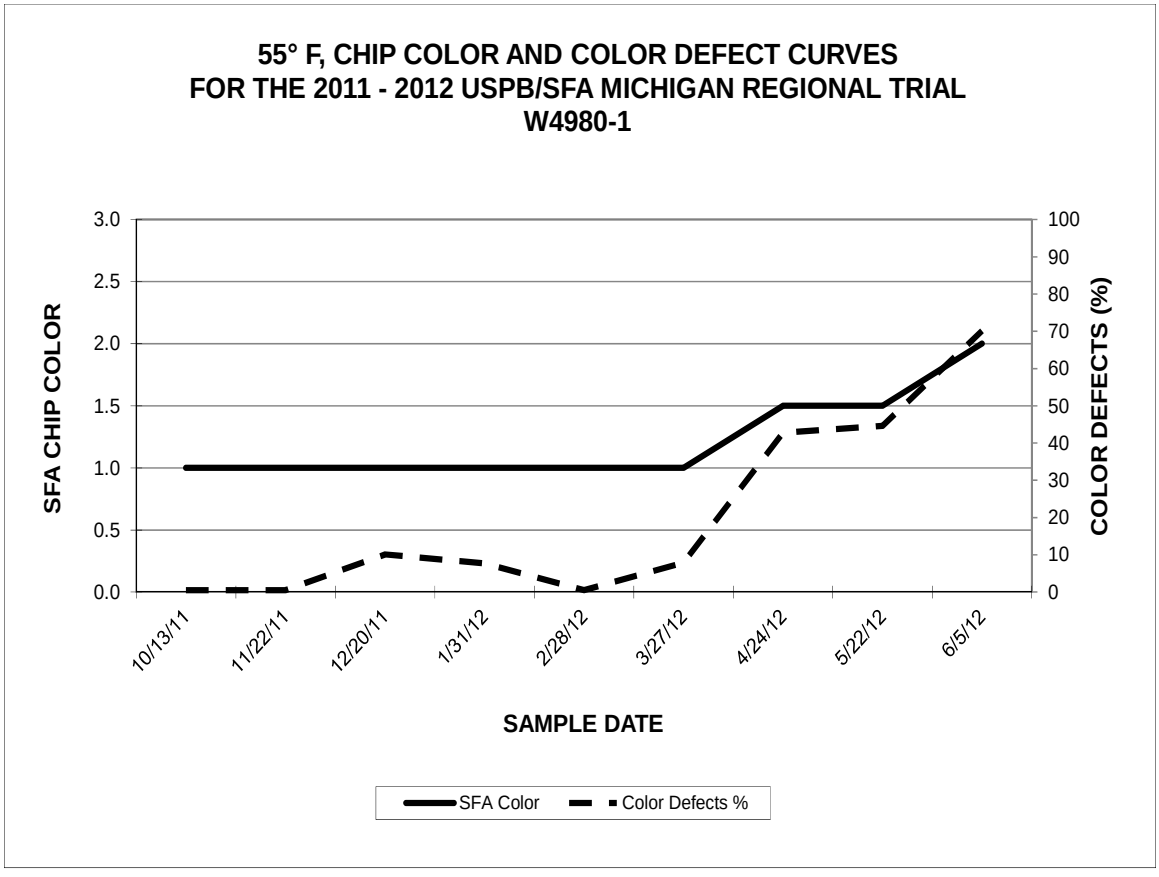

Figure 33.

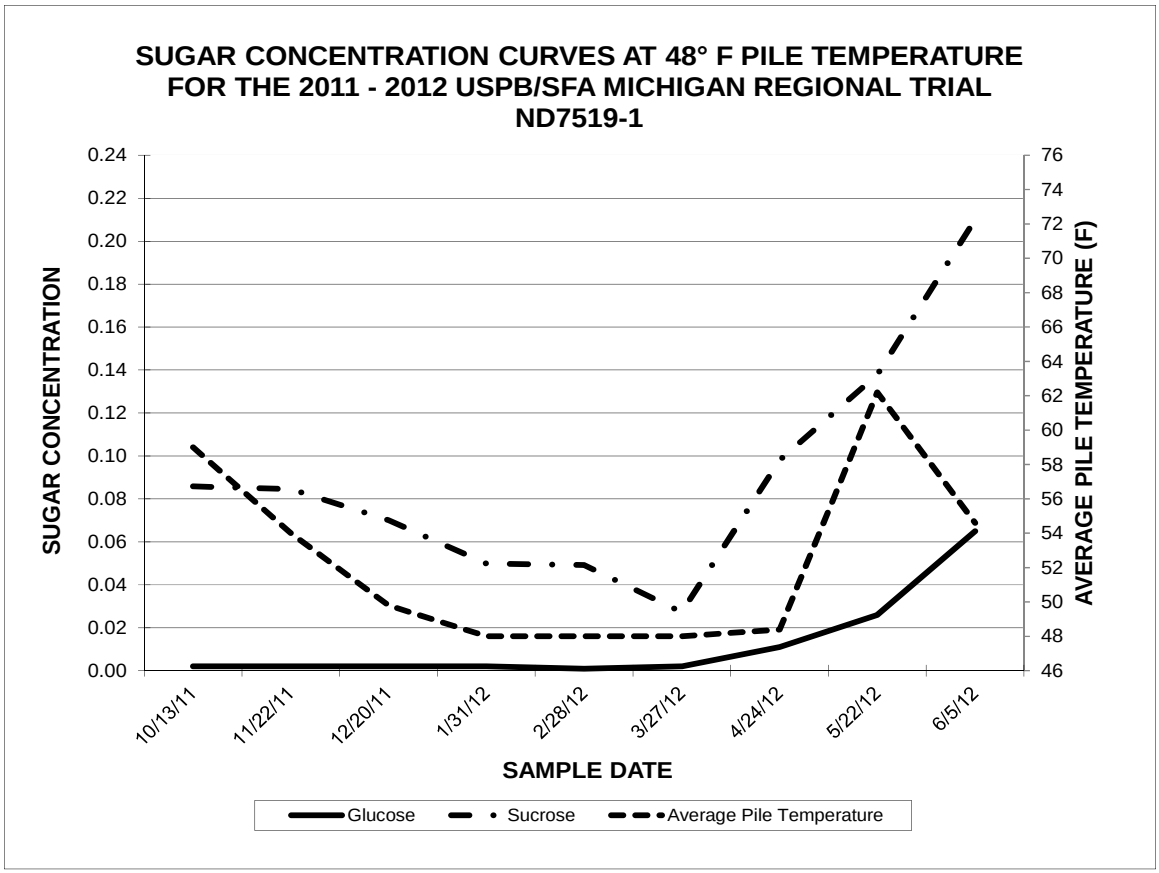

Figure 34.

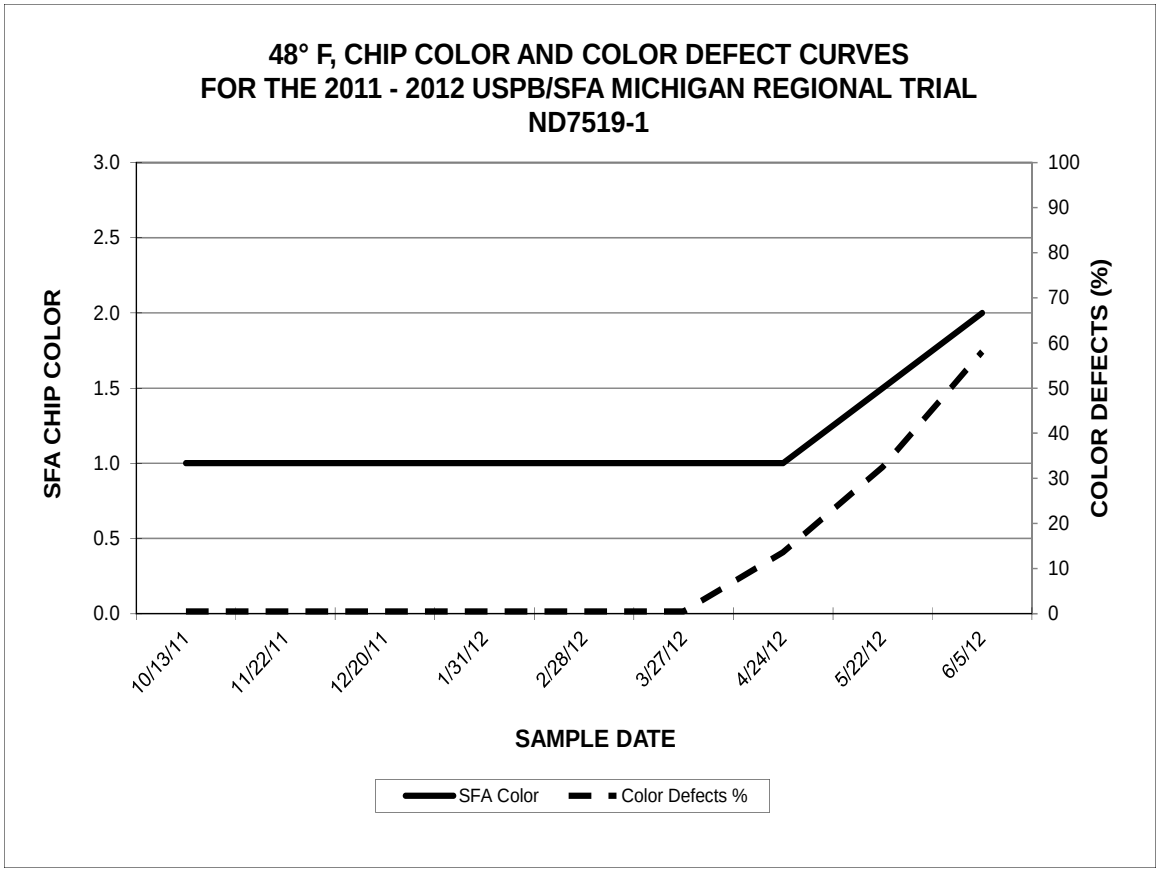

Figure 35.

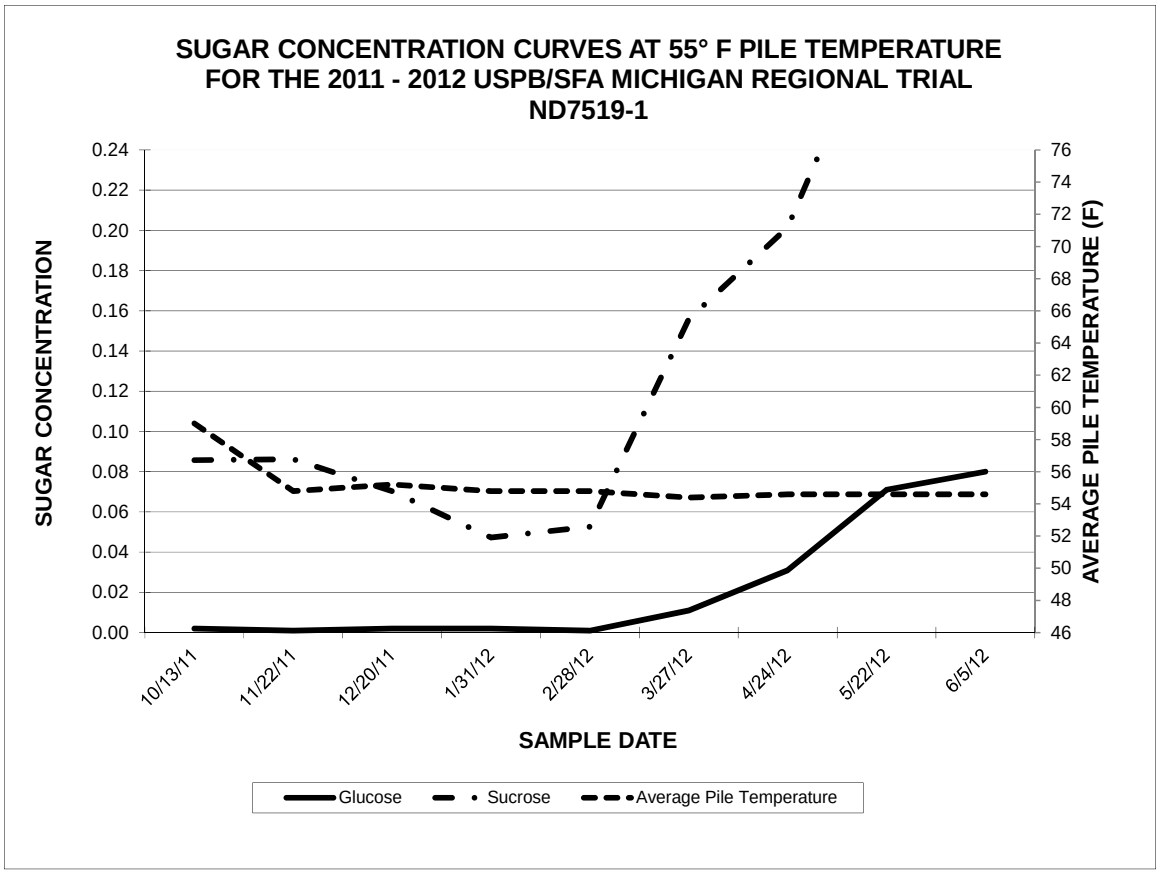

Figure 36.

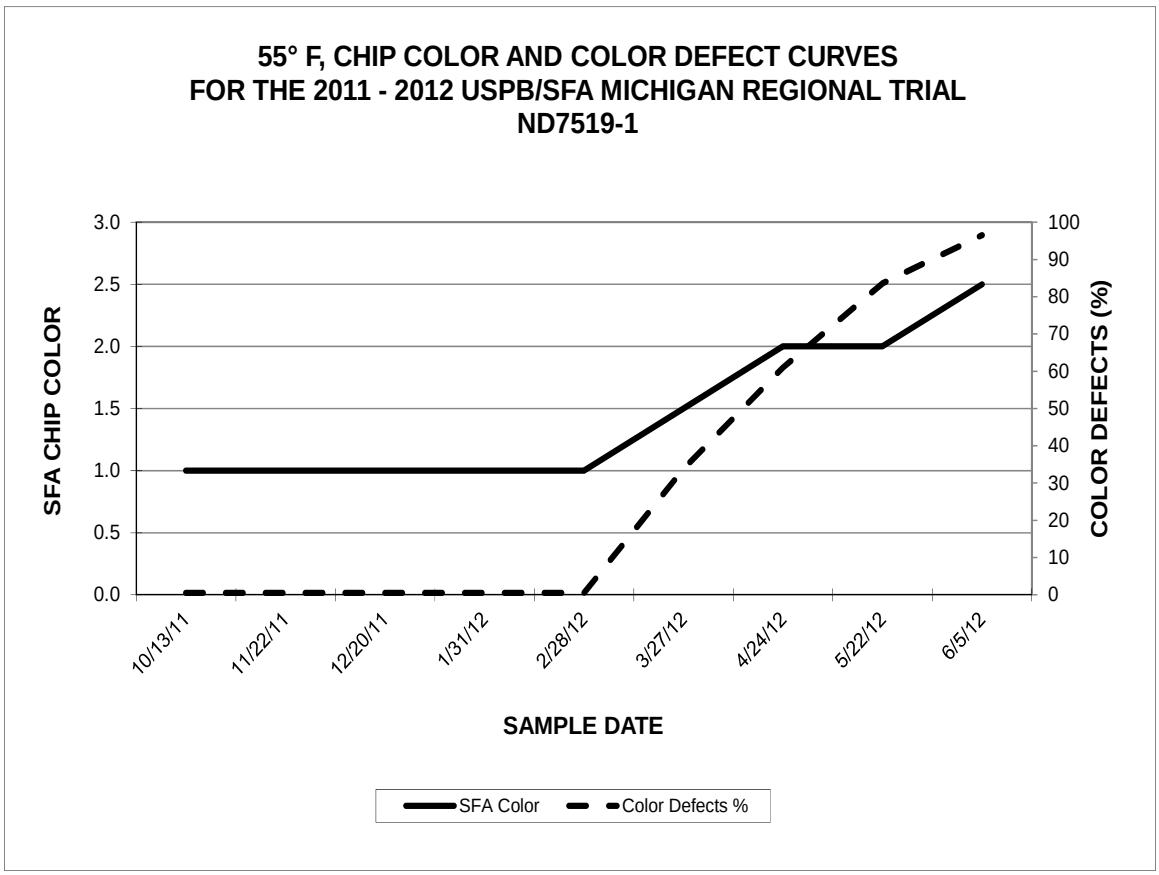

Figure 37.

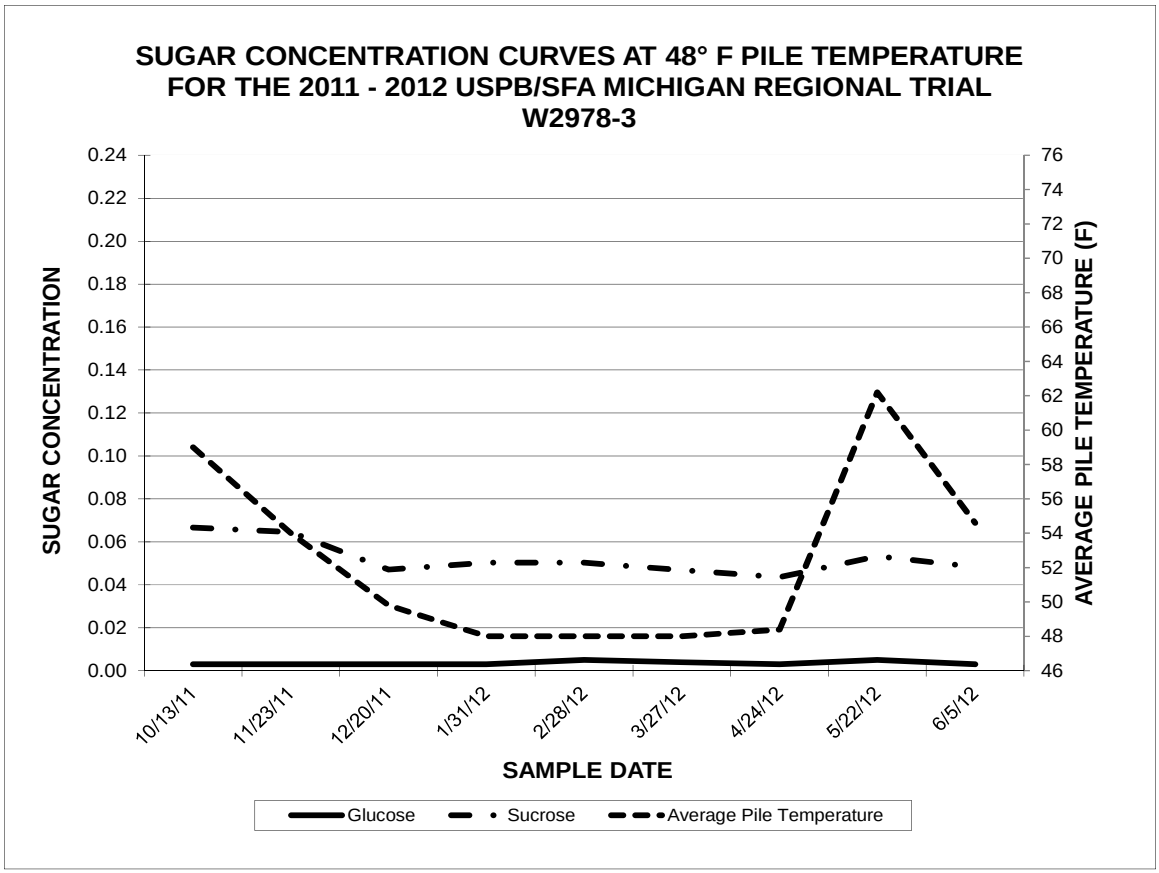

Figure 38.

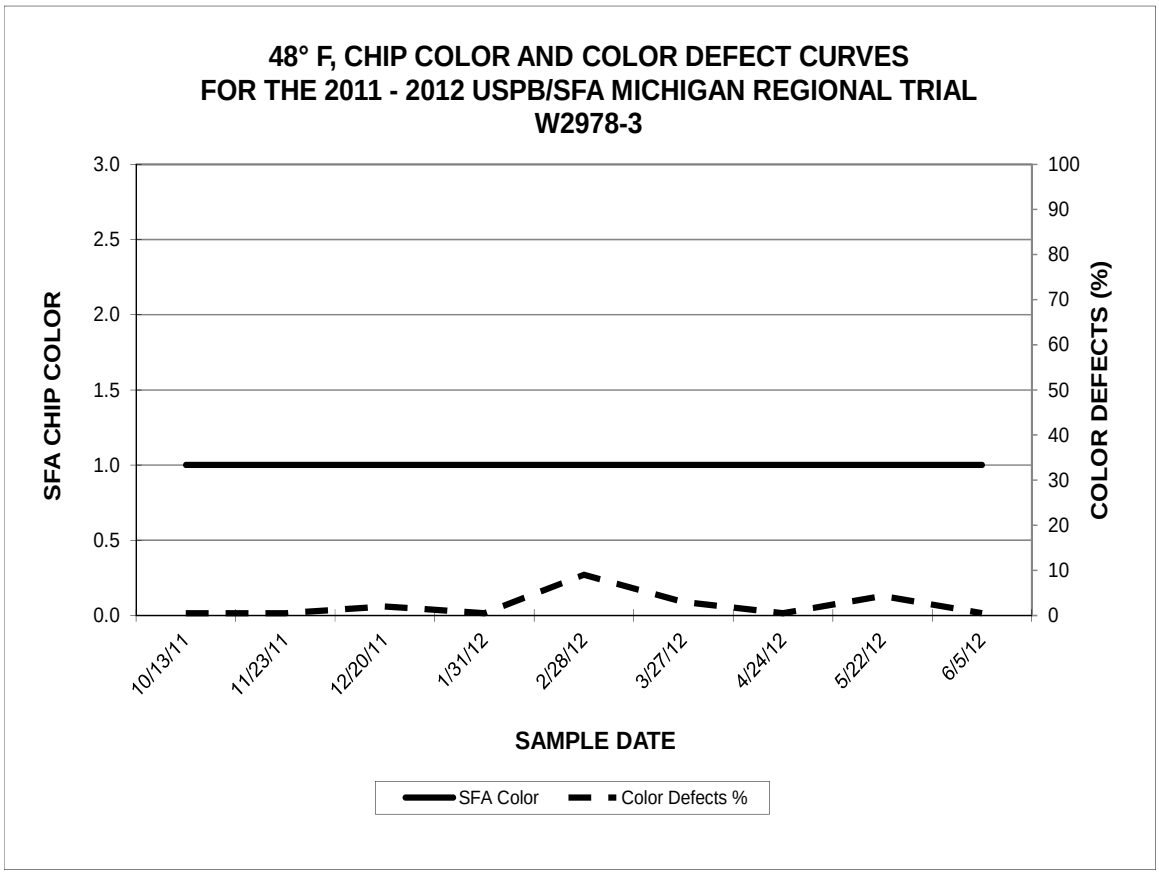

Figure 39.

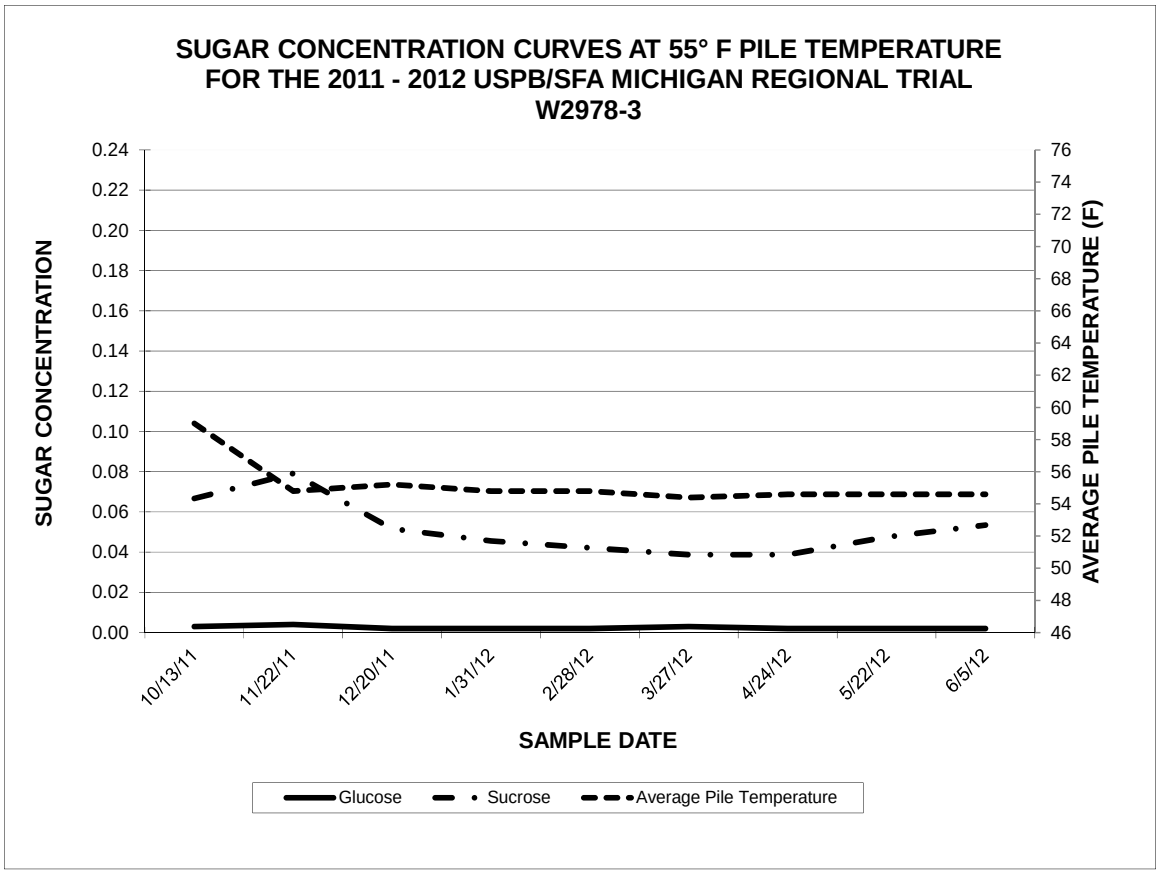

Figure 40.

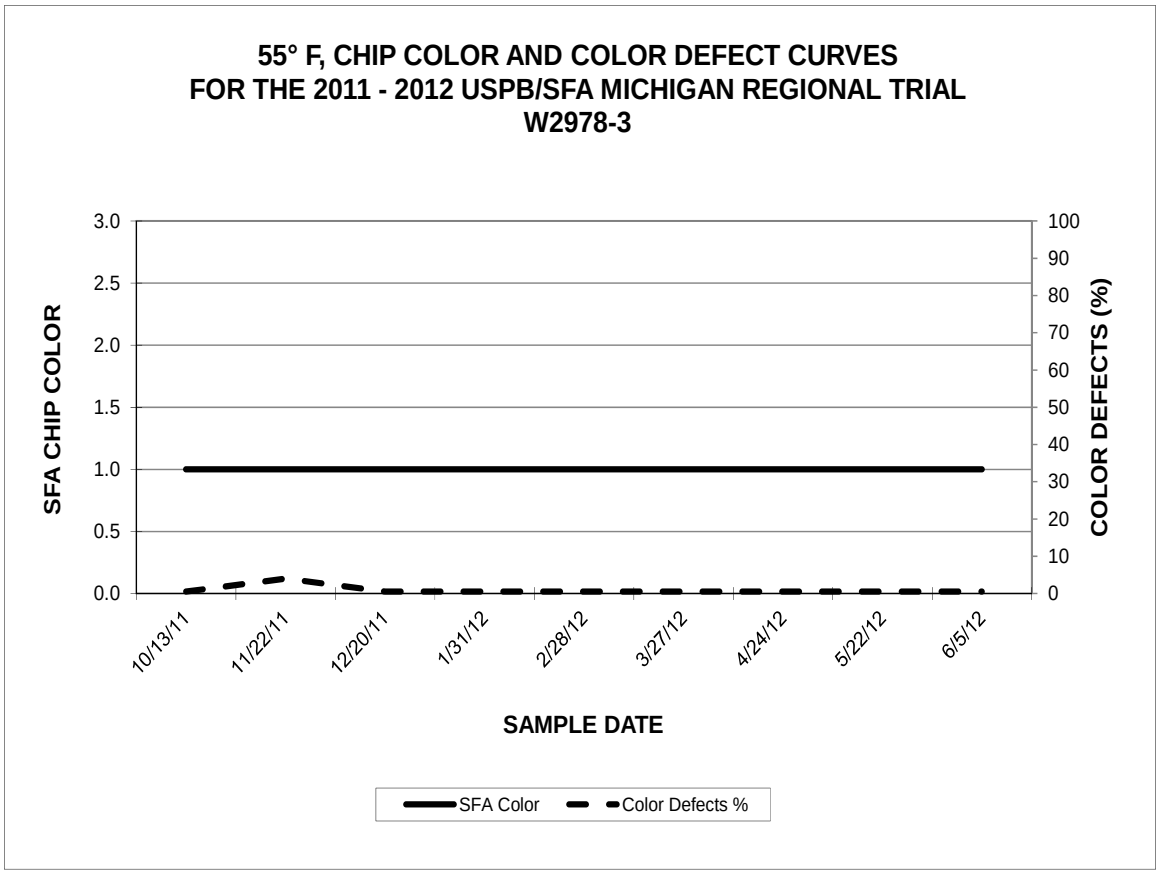

Figure 41.

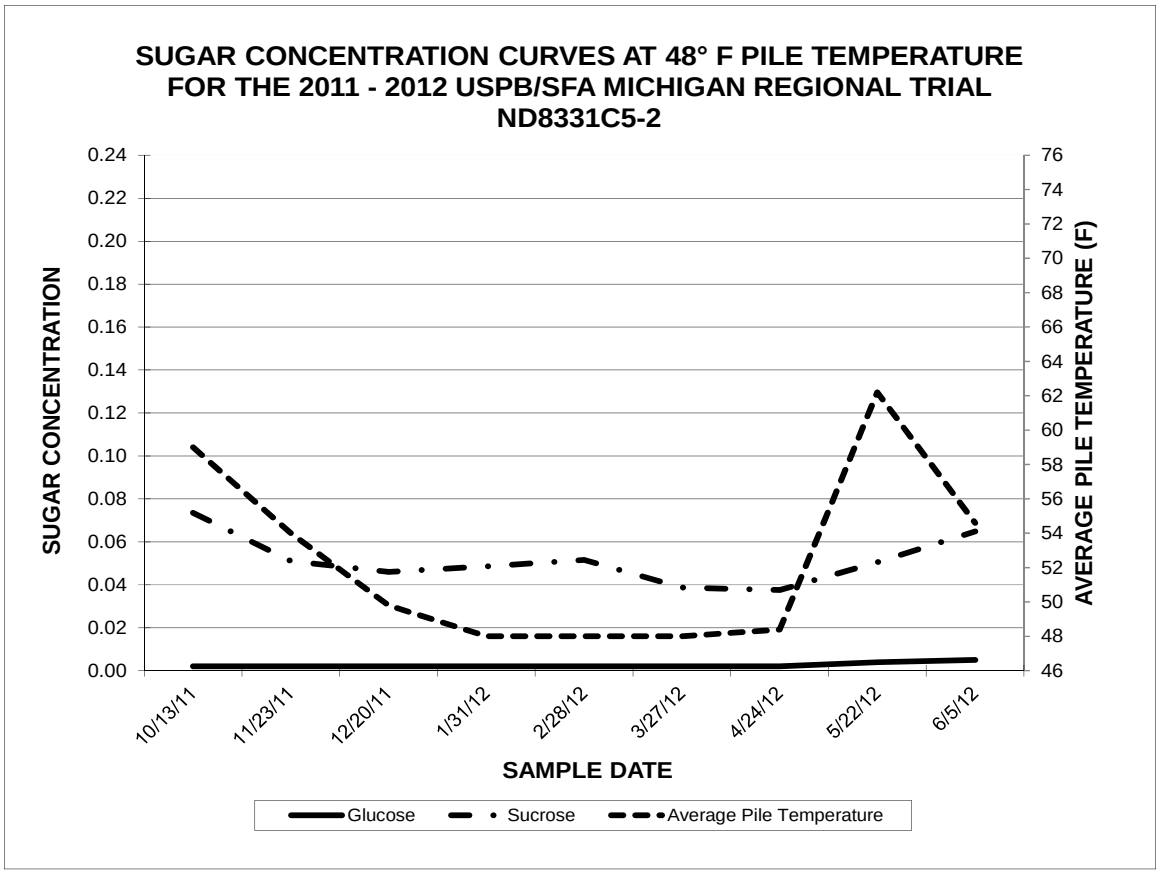

Figure 42.

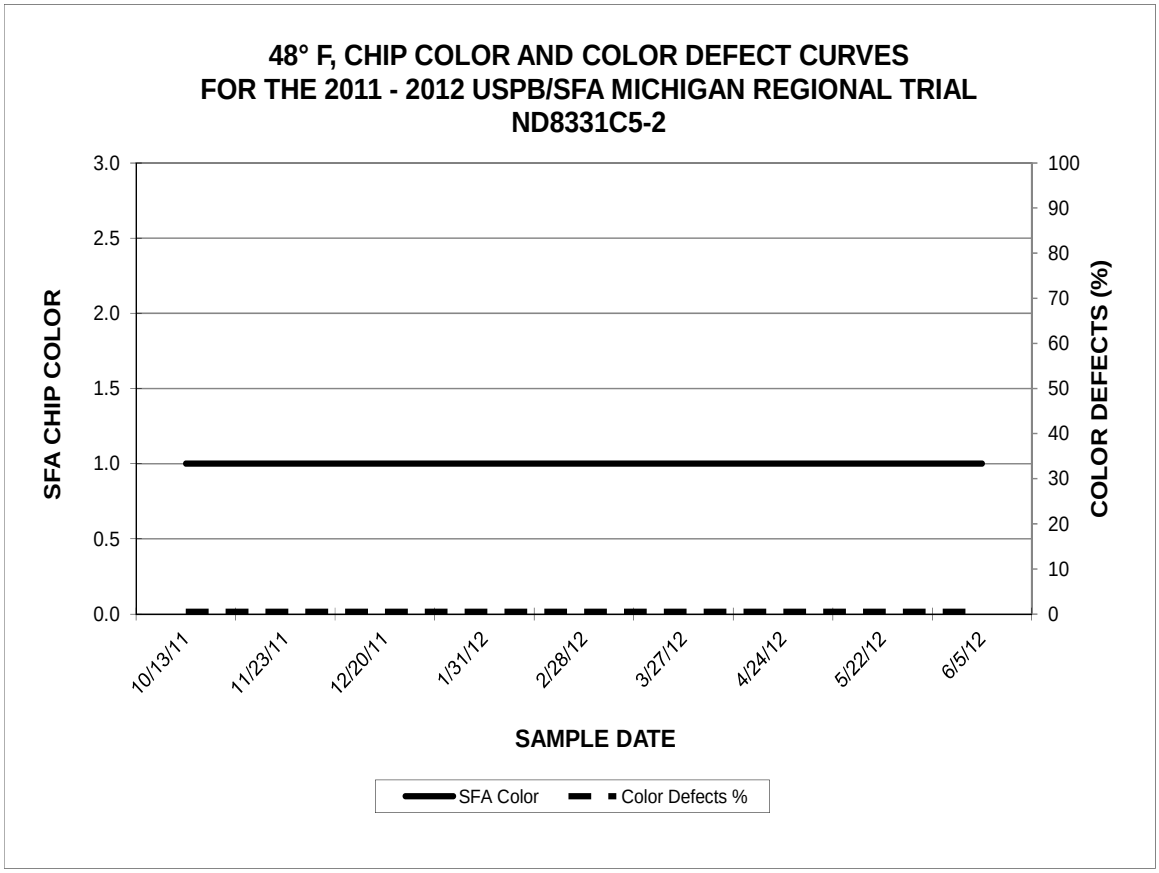

Figure 43.

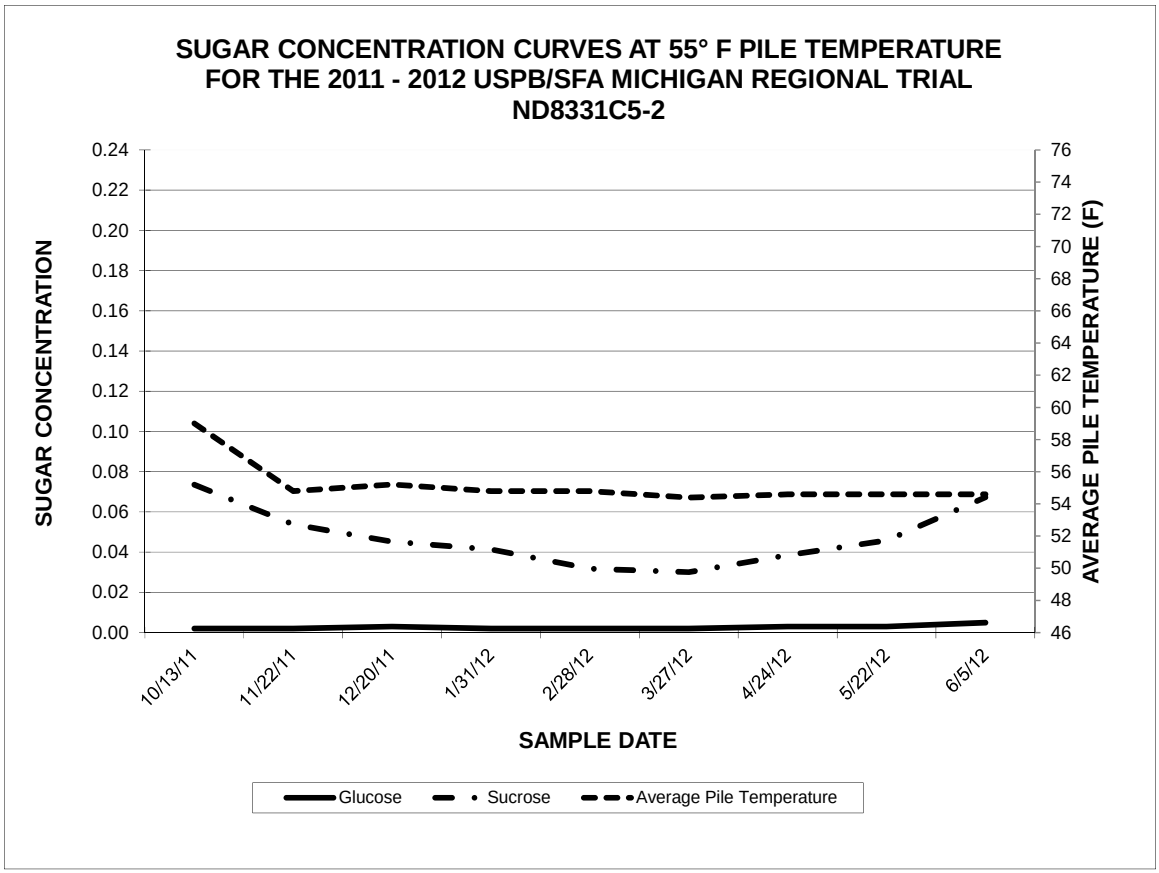

Figure 44.

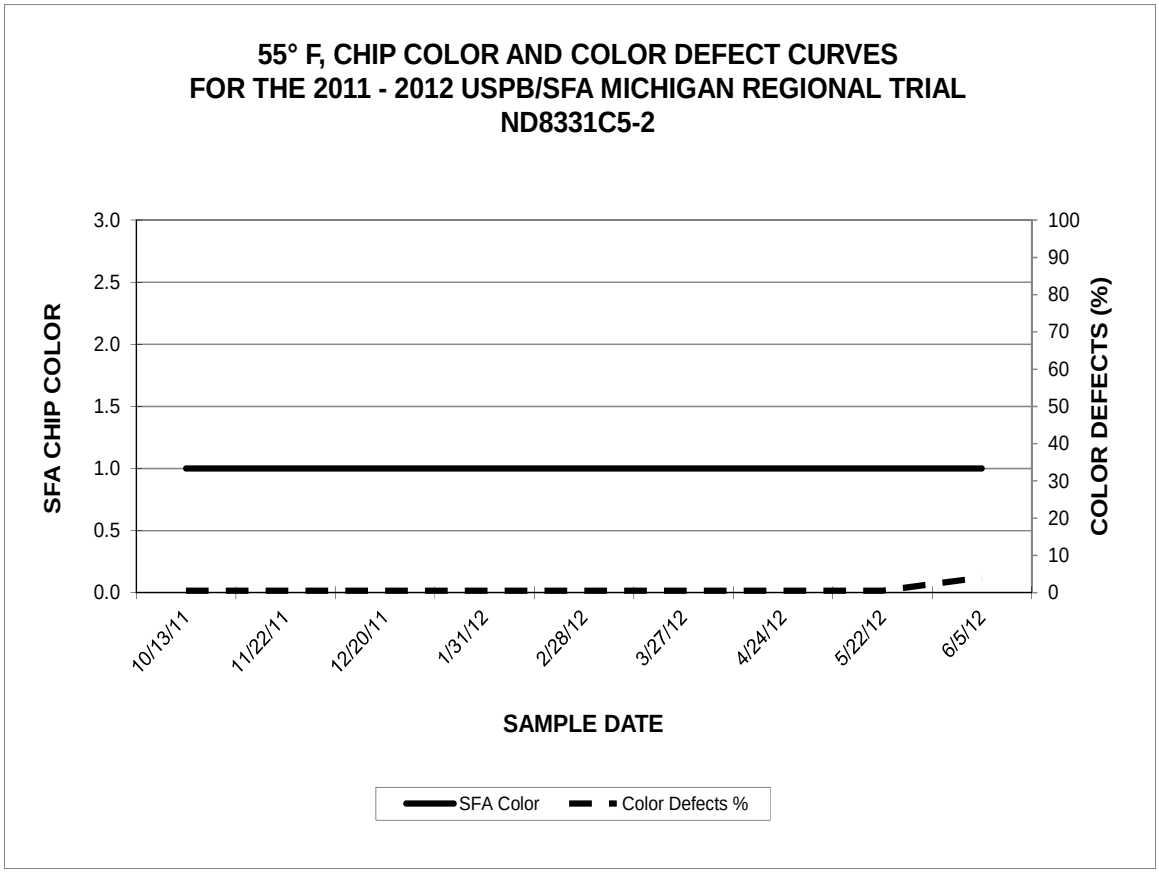

Figure 45.

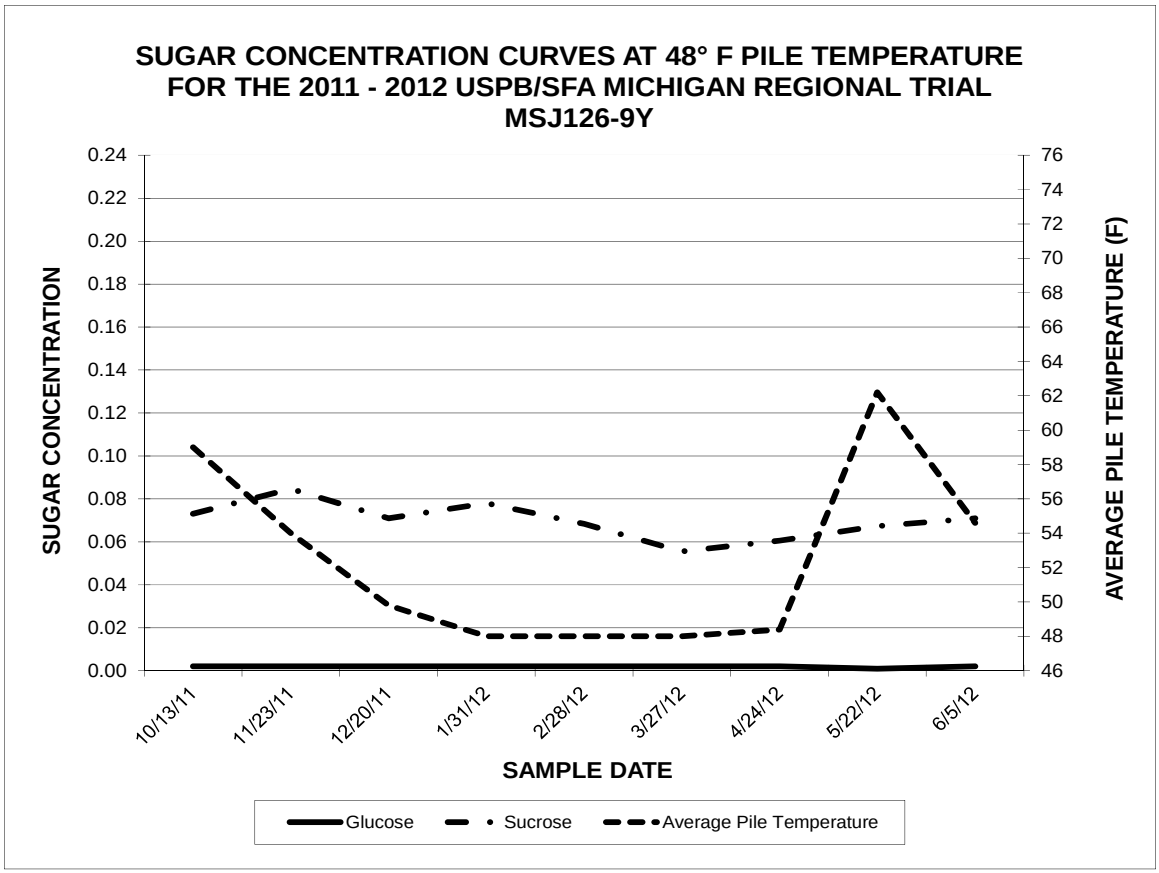

Figure 46.

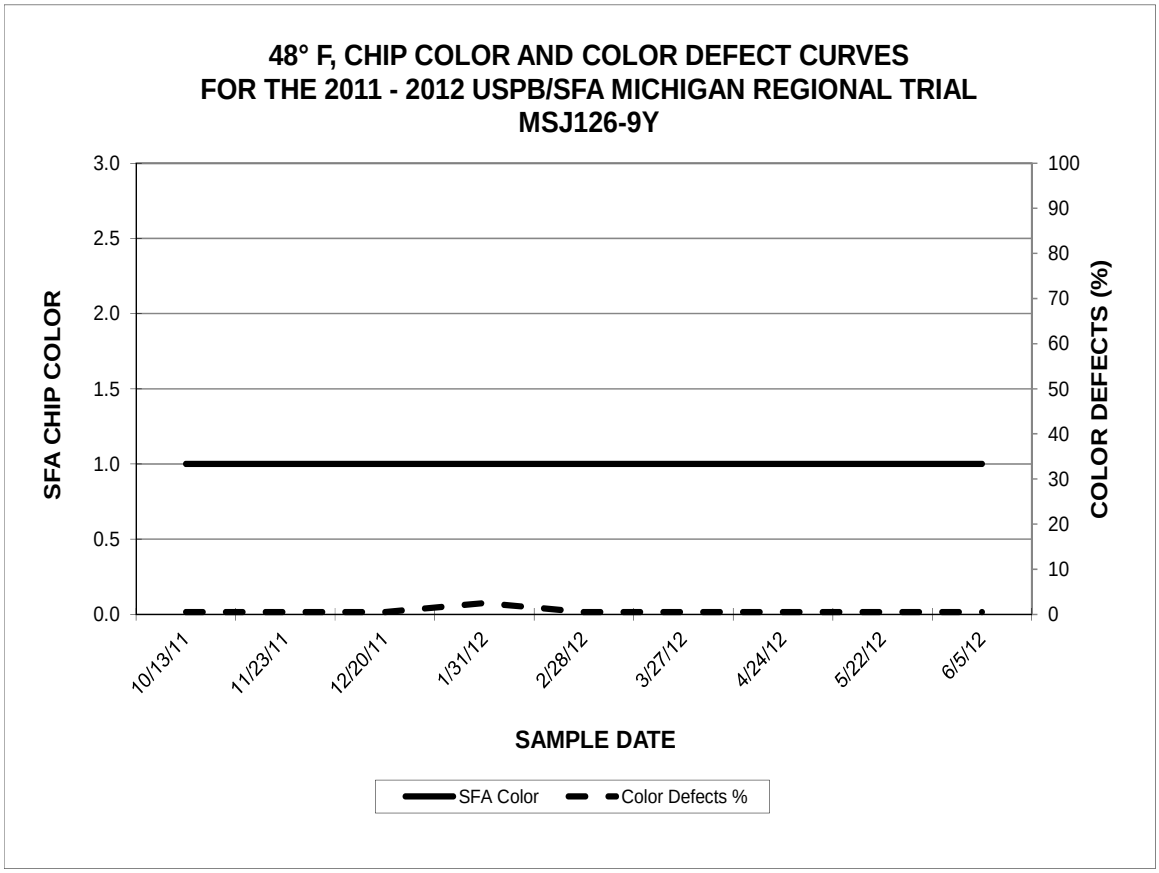

Figure 47.

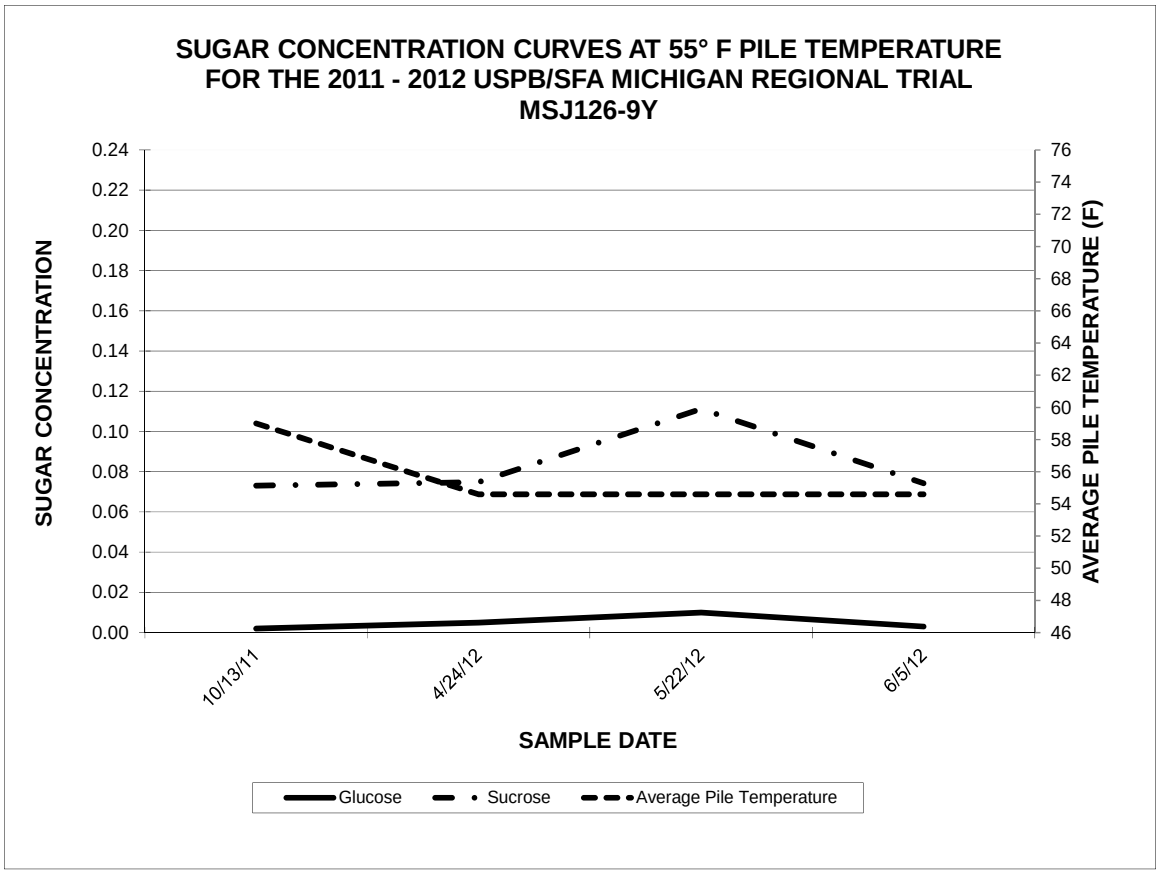

Figure 48.

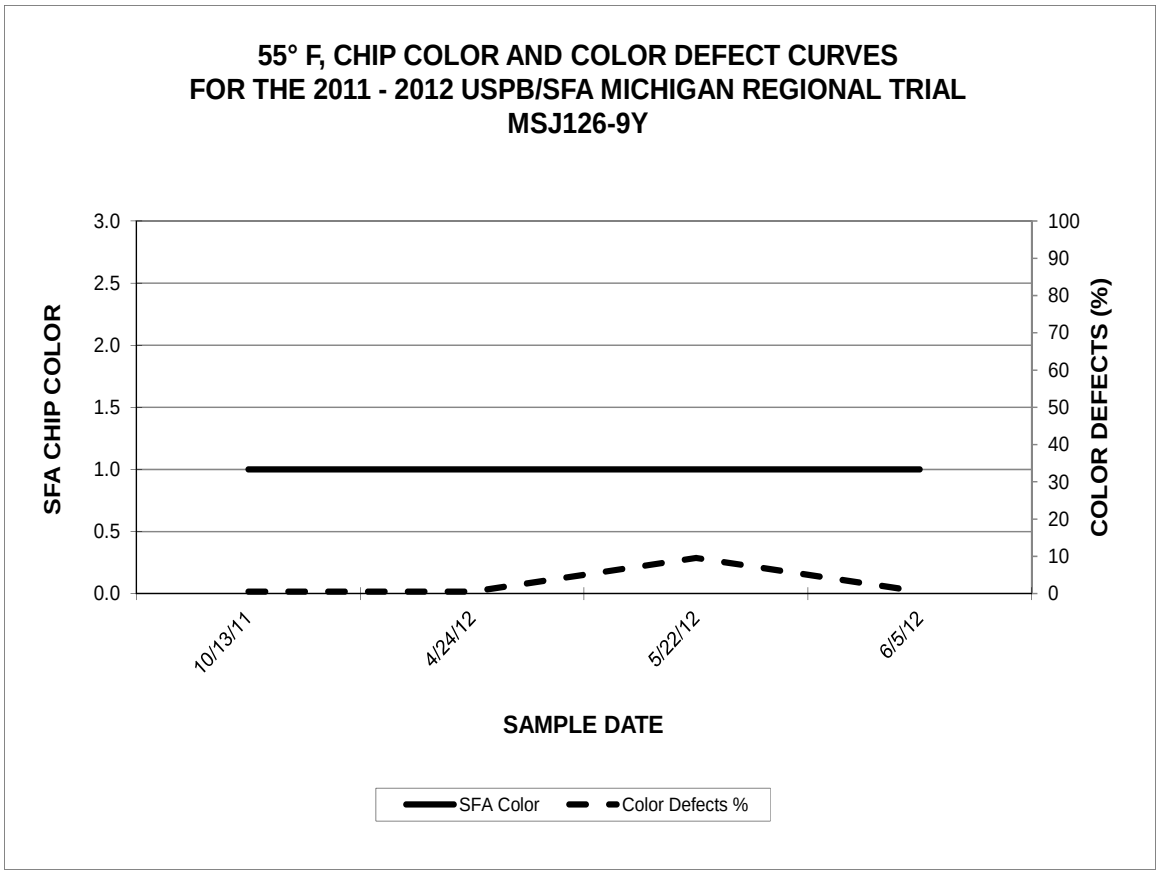

Figure 49.

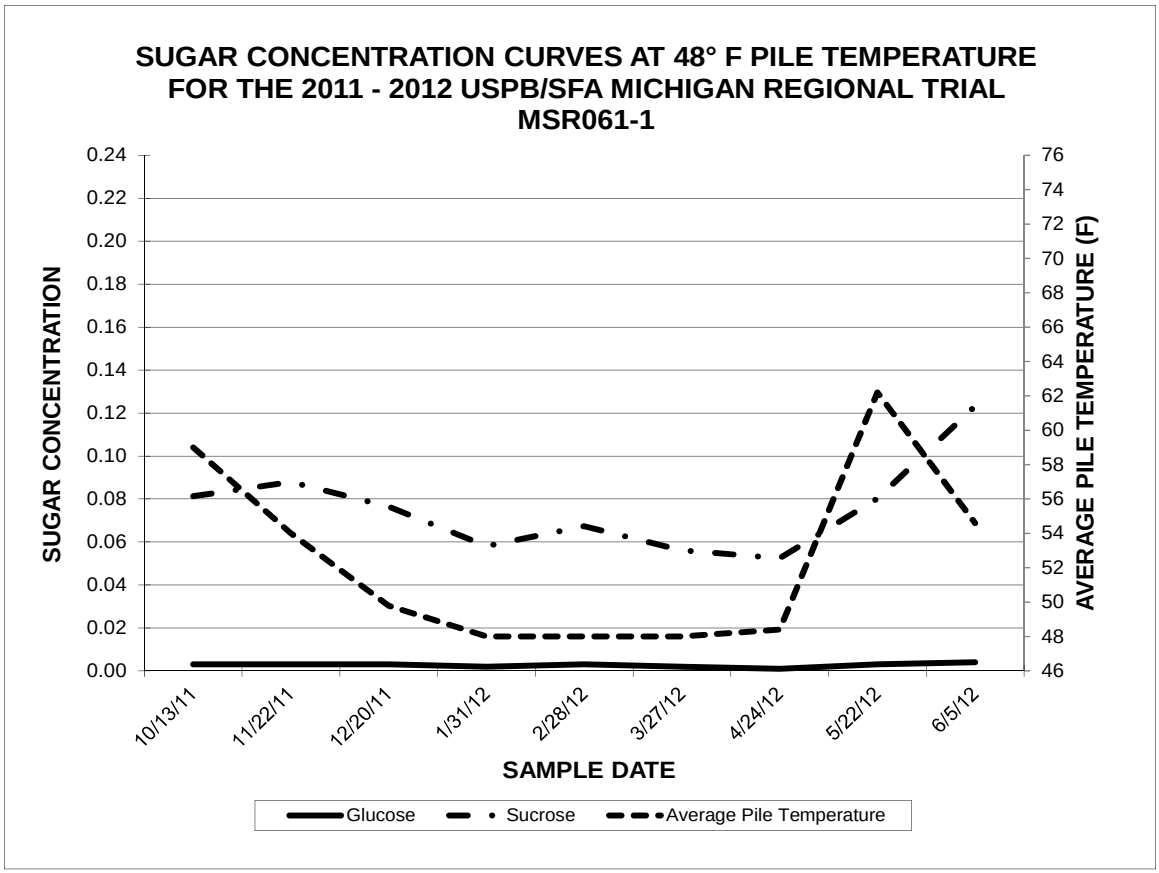

Figure 50.

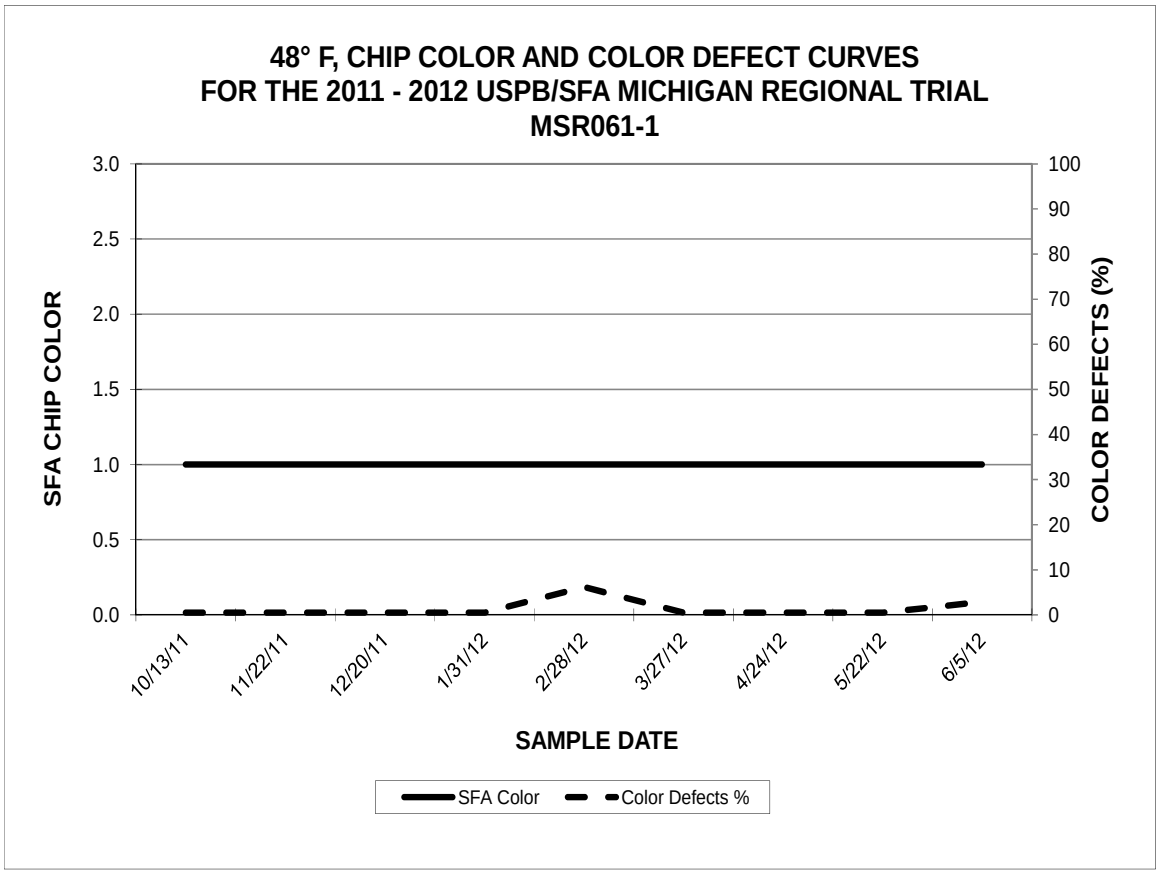

Figure 51.

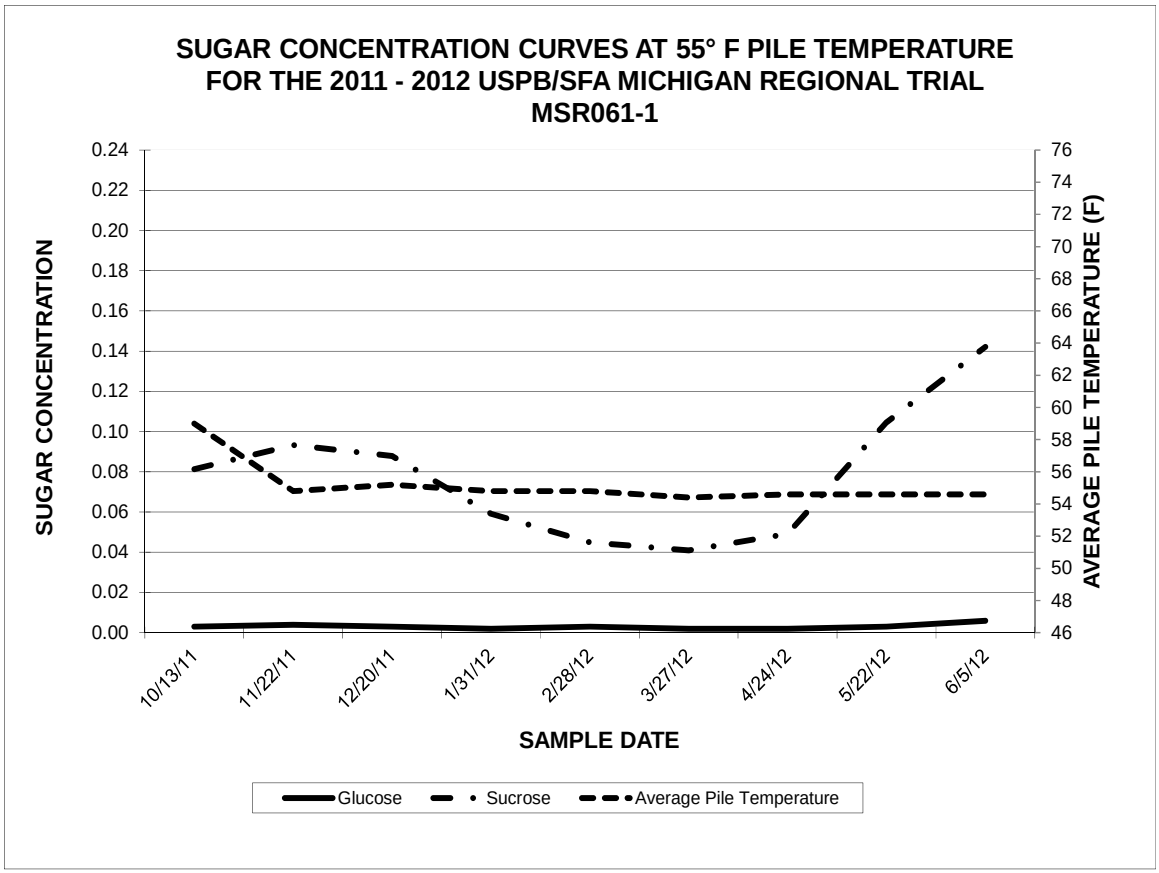

Figure 52.

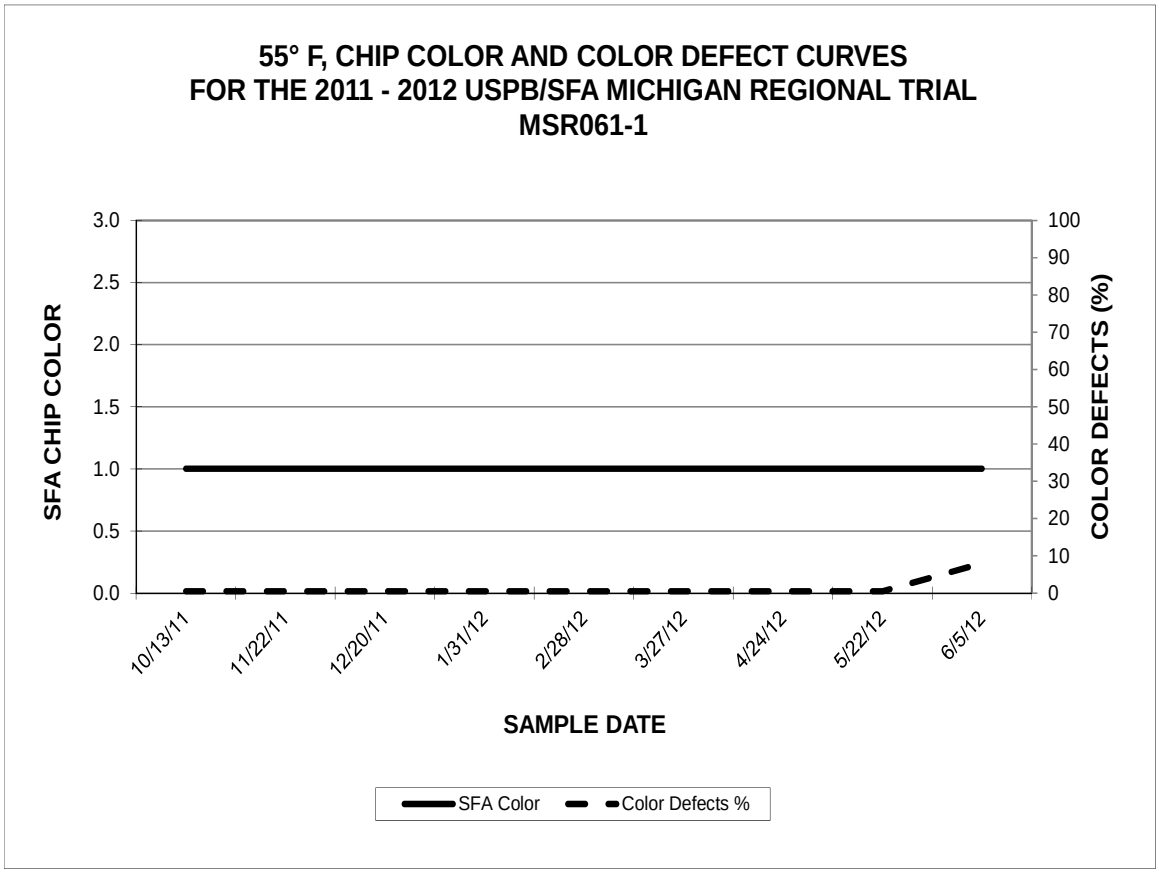

Figure 53.

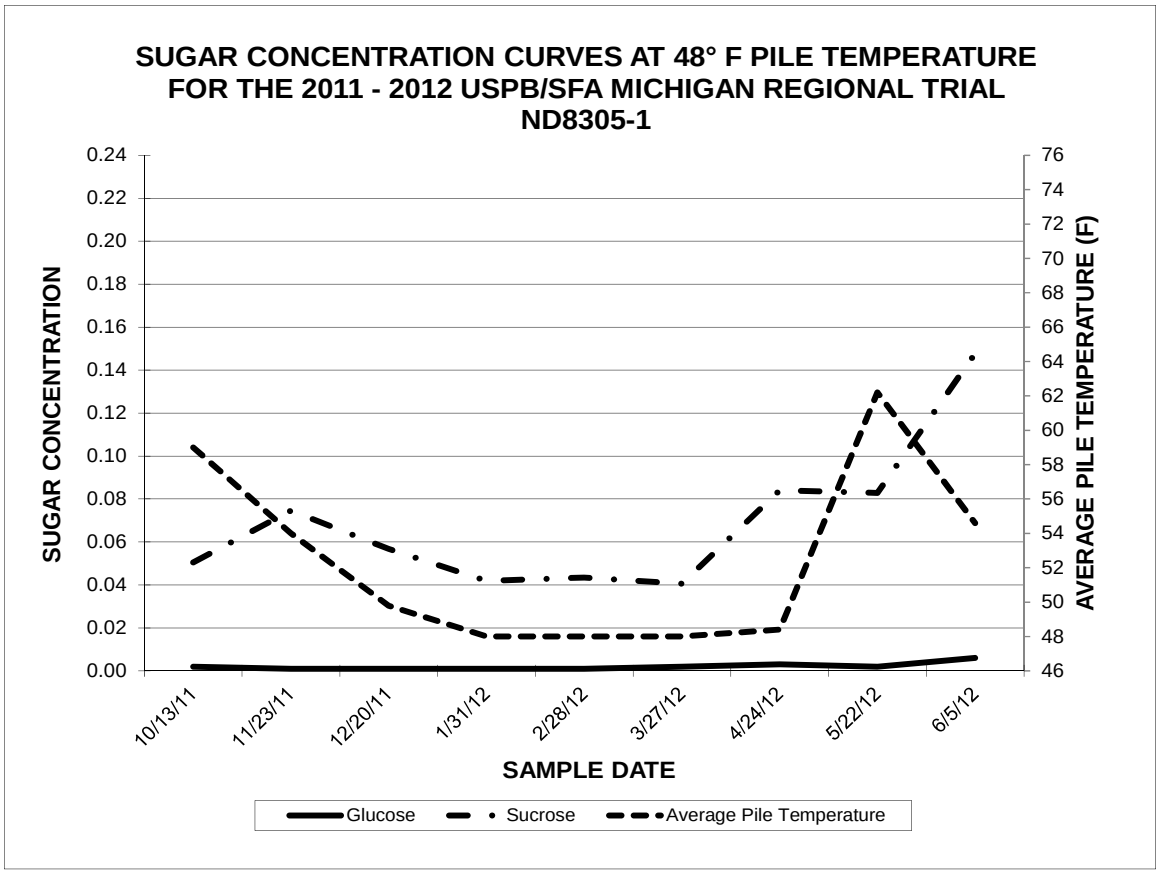

Figure 54.

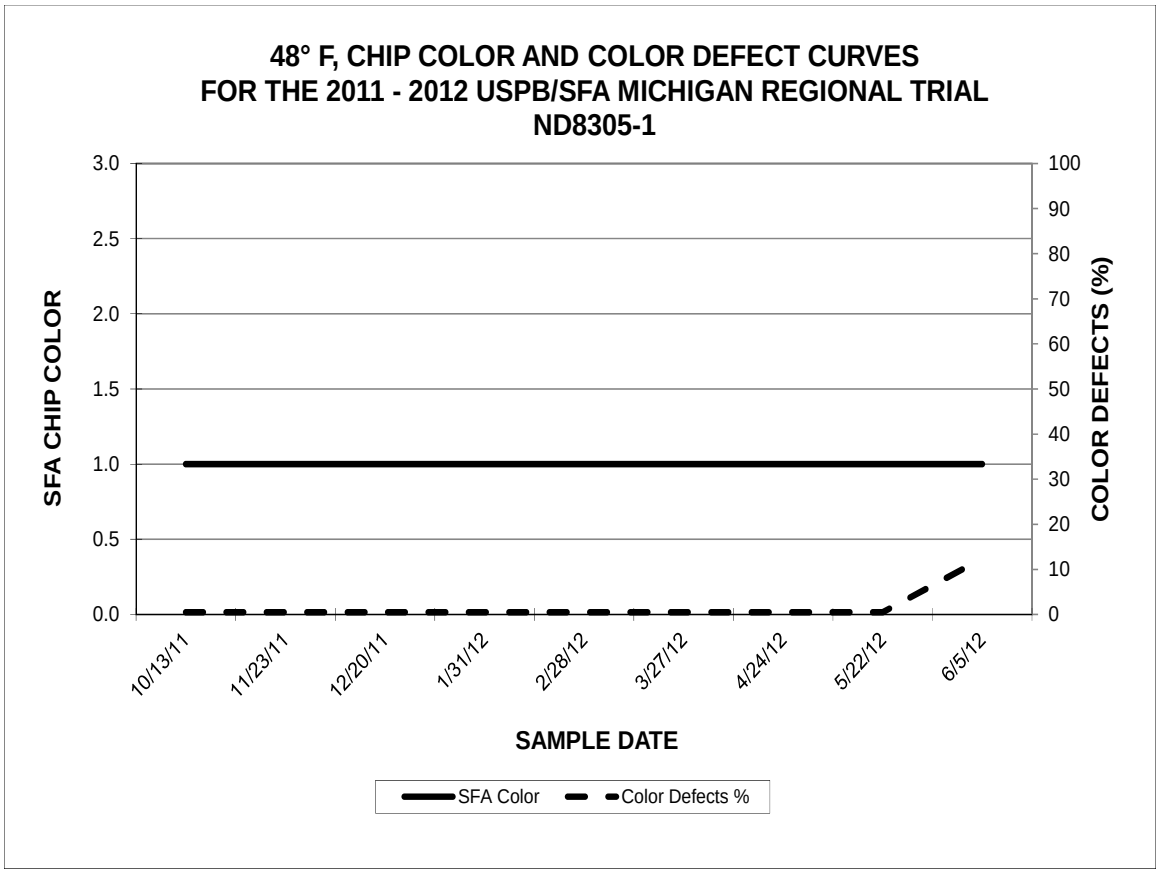

Figure 55.

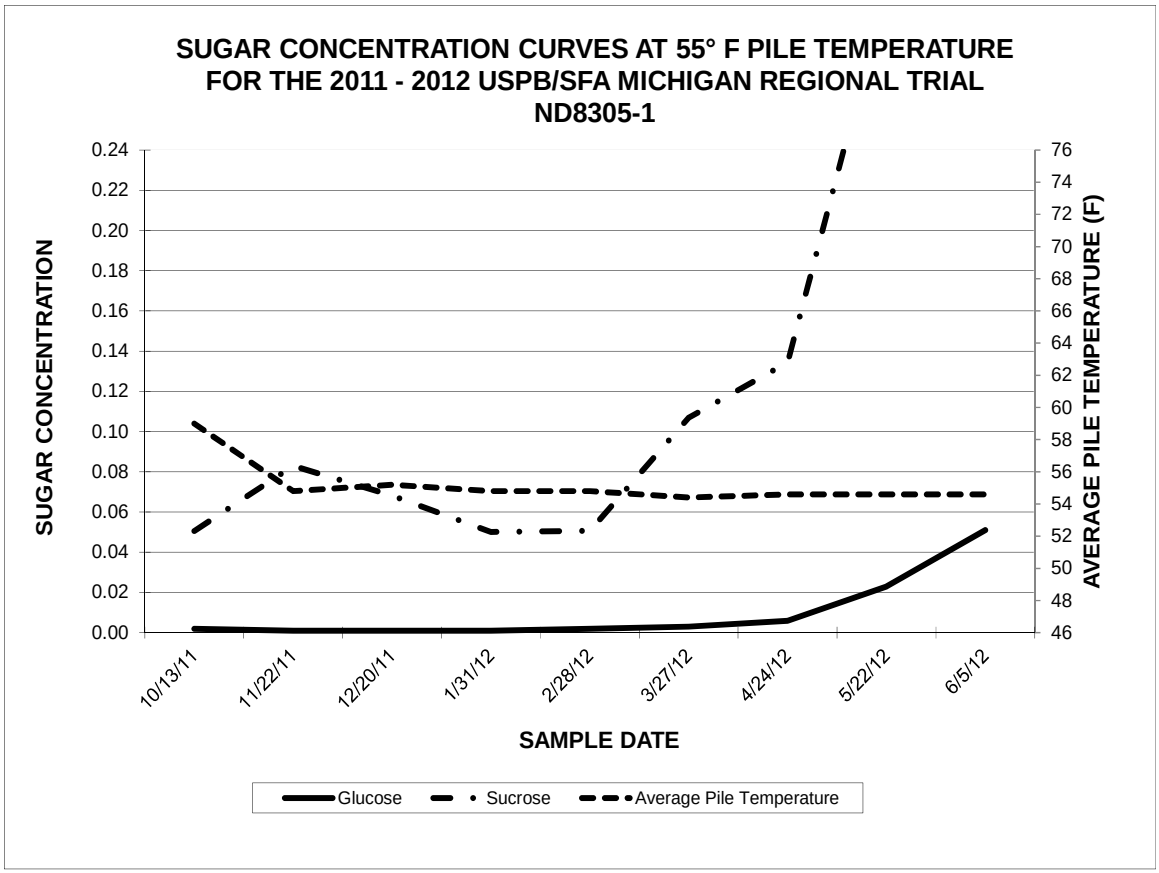

Figure 56.

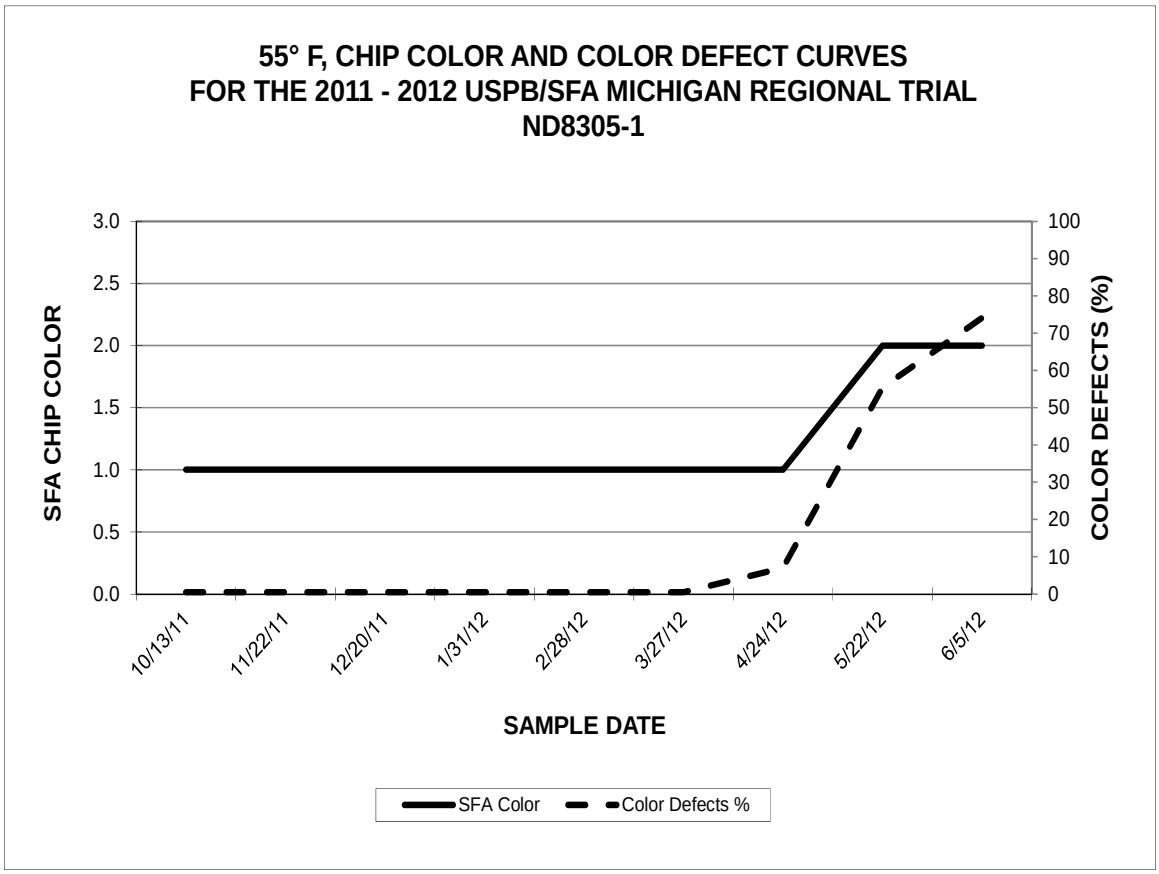

Figure 57.

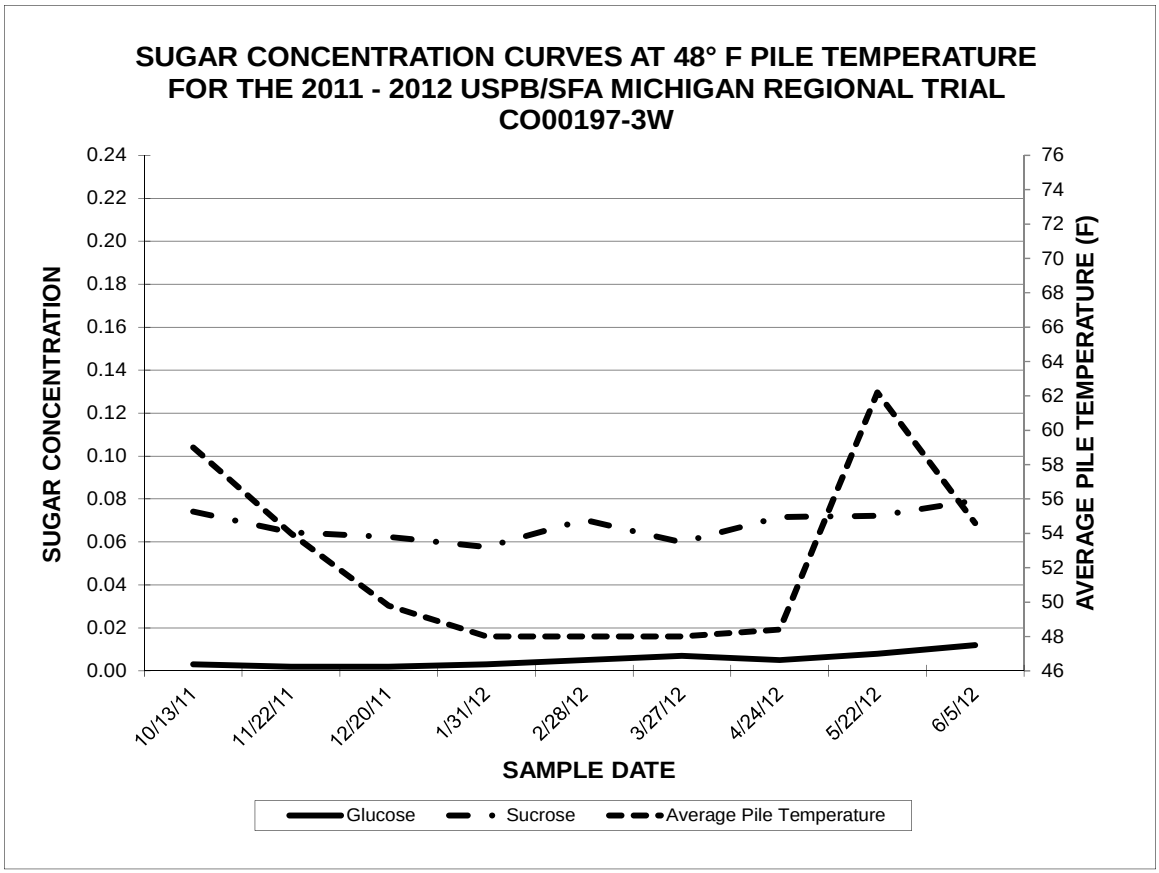

Figure 58.

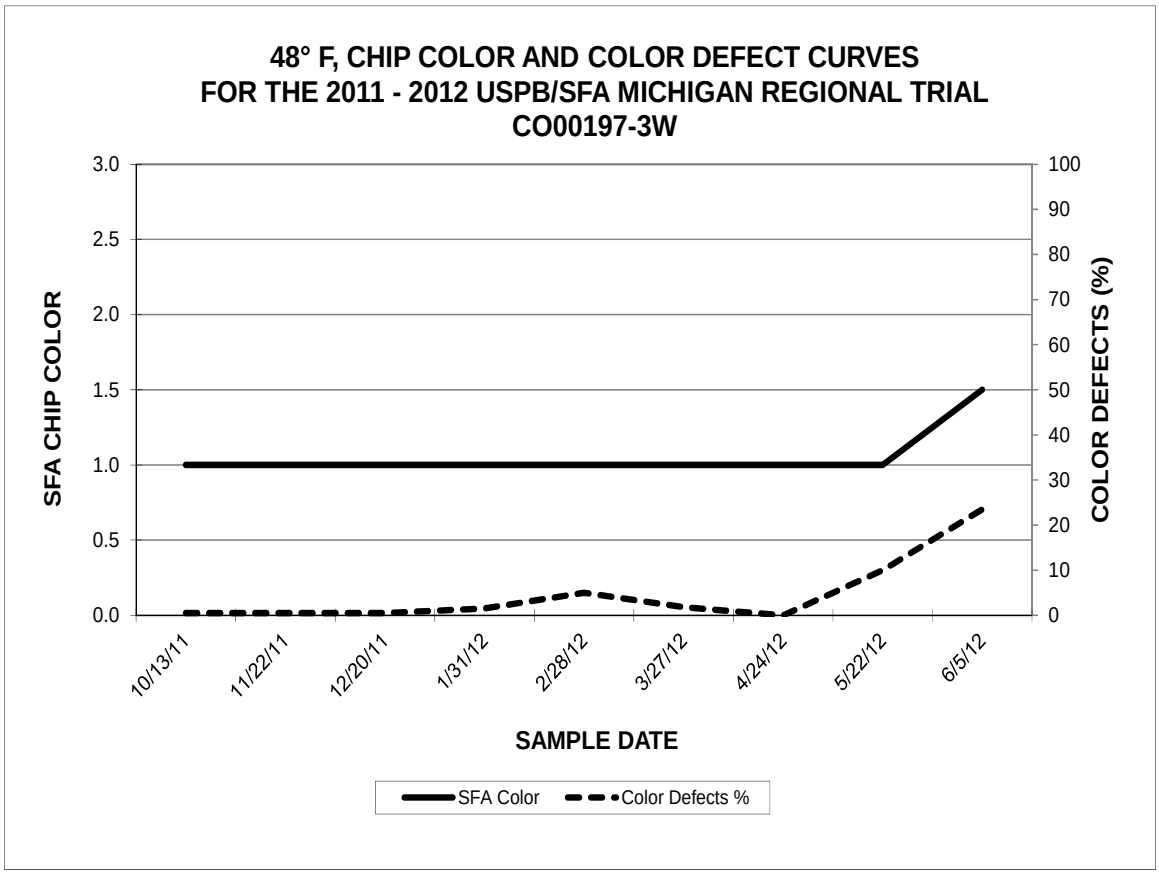

Figure 59.

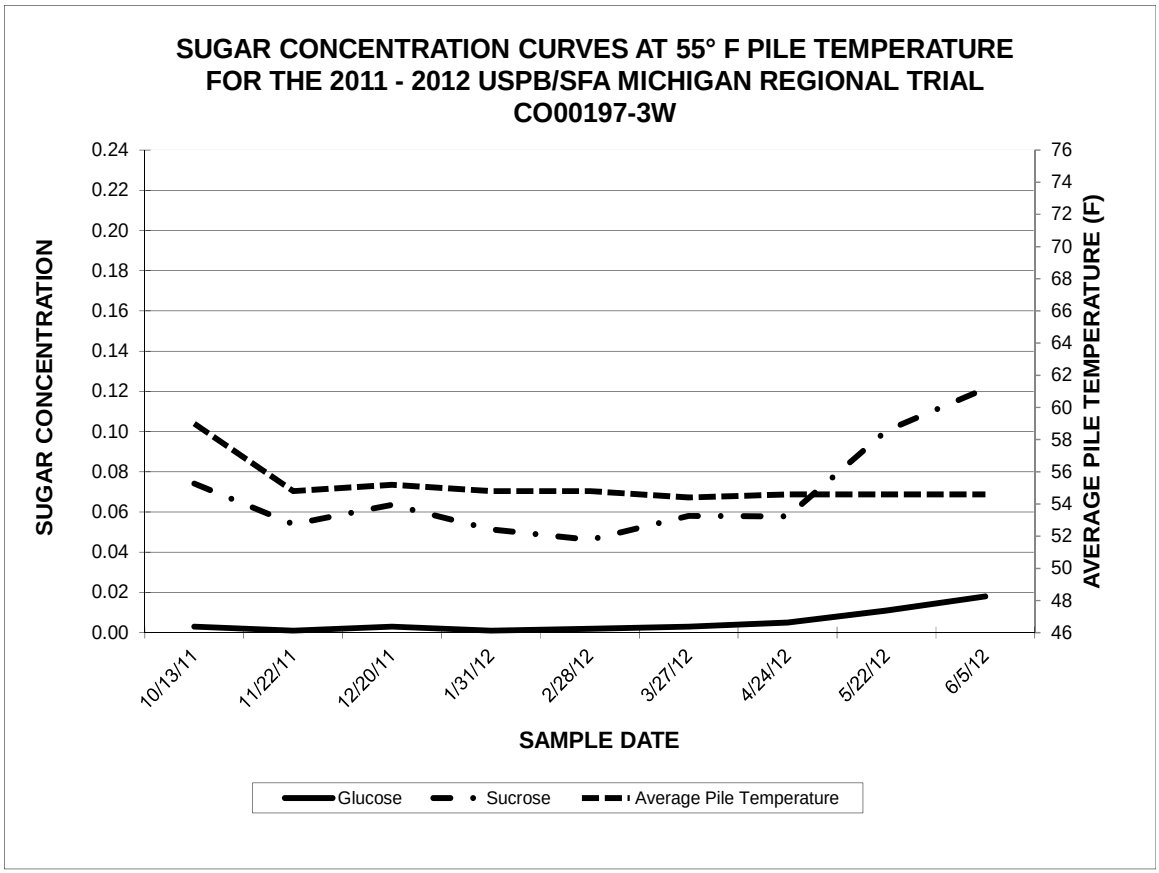

Figure 60.