NEW YOUNG STAR CANDIDATES IN THE TAURUS–AURIGA REGION AS SELECTED FROM THE *WIDE-FIELD INFRARED SURVEY EXPLORER*

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ABSTRACT

The Taurus Molecular Cloud subtends a large solid angle on the sky, in excess of 250 deg². The search for legitimate Taurus members to date has been limited by sky coverage as well as the challenge of distinguishing members from field interlopers. The *Wide-field Infrared Survey Explorer* has recently observed the entire sky, and we take advantage of the opportunity to search for young stellar object (YSO) candidate Taurus members from a ~260 deg² region designed to encompass previously identified Taurus members. We use near- and mid-infrared colors to select objects with apparent infrared excesses and incorporate other catalogs of ancillary data to present a list of rediscovered Taurus YSOs with infrared excesses (taken to be due to circumstellar disks), a list of rejected YSO candidates (largely galaxies), and a list of 94 surviving candidate new YSO-like Taurus members. There is likely to be contamination lingering in this candidate list, and follow-up spectra are warranted.

Key words: circumstellar matter – infrared: stars – stars: formation – stars: pre-main sequence

Online-only material: color figures, figure set, machine-readable tables

1. INTRODUCTION

In recent years, there have been many infrared (IR) studies of nearby star-forming regions with the *Spitzer Space Telescope* (Werner et al. 2004). Since most, if not all, low-mass stars form with circumstellar accretion disks, they have IR excesses for as long as the dusty circumstellar material survives (e.g., Hernandez et al. 2008). Stars with large IR excesses are relatively easily distinguished from stars without such excesses, while stars with more modest excesses require more accurate knowledge of the underlying star and the intervening extinction. Surveys with *Spitzer* have proven very good at finding new young stars in star-forming regions, some located surprisingly far from the traditional locations of star formation based on CO gas or *IRAS* dust maps. However, even though *Spitzer* is able to survey large areas relatively quickly, it still is a pointed observatory and cannot easily conduct a truly wide-field survey. In very close star-forming regions such as Taurus, the large solid angle subtended by the association challenges the search for new members, rendering the samples incomplete, particularly for a distributed population. See, however, Rebull et al. (2010).

We conducted a ~44 deg² survey of Taurus with *Spitzer*, using 3.6, 4.5, 5.8, 8, 24, 70, and 160 μ m (D. L. Padgett et al. 2011, in preparation; Padgett et al. 2008b; Güdel et al. 2007b). In Rebull et al. (2010), we reported on our search for new young stellar objects (YSOs) in Taurus. We used a primarily *Spitzer*-driven

color selection, but took advantage of considerable ancillary data amassed in the service of a multi-wavelength search for new young stars. We found that any solely near- and mid-infrared color selection was filled with contamination from galaxies and asymptotic giant branch (AGB) stars, and that use of ancillary data was crucial to establishing a list of high-quality new members of Taurus. We now use our experience with this prior data set to inform our selection using the *Wide-field Infrared Survey Explorer* (*WISE*; Wright et al. 2010) data.

WISE conducted an all-sky survey in 2009–2011. These data are well-suited to studying nearby star-forming clouds such as Taurus, where members are likely to be bright because of their proximity to us as well as their youth, and well within the regime of good signal-to-noise ratio (S/N) *WISE* photometry. Furthermore, the all-sky nature of the survey allows us to look away from the more traditional and well-studied clustered regions and include some young stars in the direction of Taurus (not necessarily Taurus members) that were never studied with *Spitzer*.

WISE surveyed the entire sky, but the depth of coverage is non-uniform and generally greater at higher ecliptic latitudes (Taurus is in the ecliptic plane). The depth of coverage in the Taurus region is somewhat degraded relative to regions of comparable ecliptic latitude due to Moon avoidance maneuvers made during the mission. Most of the Taurus region is observed to a depth of about 0.08, 0.11, 0.8, and 6 mJy in the four bands (5 σ , given eight visits), and we further restrict the depth with S/N cuts; see below. Our original Taurus *Spitzer* Survey went to 0.06, 0.06, 0.14, and 1.1 mJy for IRAC-1 (3.6 μ m), IRAC-2 (4.5 μ m), IRAC-4 (8 μ m), and MIPS-24 (24 μ m), respectively. However, both surveys should easily detect legitimate Taurus members, since the cloud is only 140 pc away.

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Figure 1. Location in the sky of the various surveys discussed here. Solid black box: boundary of Goldsmith et al. (2008) CO(1–0) survey; gray-colored regions: SDSS coverage; smaller irregular black dotted polygon: coverage of *Spitzer* Taurus Survey (D. L. Padgett et al. 2011, in preparation; Padgett et al. 2008b; Güdel et al. 2007b); red dash-dotted line: boundary of polygon extracted from *WISE* catalog; + symbols: Taurus members from Kenyon et al. (2008); diamonds: proposed Taurus members from Slesnick et al. (2006).

(A color version of this figure is available in the online journal.)

In this paper, we select new candidate Taurus members with infrared excesses using *WISE* colors using the method established in Koenig et al. (2011). We compare the list of selected objects to catalogs we have assembled from our prior work and updated. We report three lists—recovered young stars, rejected objects, and candidate new Taurus members. The observations and basic data handling are described in Section 2, Section 3 describes how we identified our YSO candidates, Section 4 presents some global properties of the ensemble of YSO candidates, with a special focus on estimating the degree of contamination, and finally we summarize in Section 5.

2. OBSERVATIONS, DATA REDUCTION, AND ANCILLARY DATA

In the context of Rebull et al. (2010), we assembled a substantial multi-wavelength database, spanning Sloan *u* through *Spitzer*/MIPS 160 μm (with some X-rays) for point sources throughout the Taurus region. We note that not every source has photometry at all bands due to variations in depth and spatial coverage among the surveys involved. We use that catalog as the core for our analysis here, updating it with confirmed Taurus members from, e.g., Kenyon et al. (2008) and Luhman et al. (2010) outside of our original *Spitzer* map. We have also searched SIMBAD (and literature references therein) for known galaxies and other contaminants such as planetary nebulae (PNe) in this vicinity and considered these identifications in our analysis of the *WISE* photometry.

Our Taurus *Spitzer* Survey spanned $\sim 44 \text{ deg}^2$; see Figure 1. Notably, two of the surveys we assembled at other wavelengths extend well beyond the region we mapped with *Spitzer*—the CO(1–0) radio map (Goldsmith et al. 2008) and two Sloan Dig-

ital Sky Survey (SDSS) stripes. Goldsmith et al. (2008) mapped $\sim 100 \text{ deg}^2$; see Figure 1. The SDSS (Finkbeiner et al. 2004; Padmanabhan et al. 2008) initially mapped the Taurus region in two perpendicular strips covering $\sim 48 \text{ deg}^2$, overlapping in part with the Goldsmith et al. (2008) and our *Spitzer* maps, but extending further east–west and substantially further north. Additional SDSS strips substantially increased the area observed; see Figure 1. We note that the unfilled stripe that crosses the region diagonally is one of the photometric calibration stripes a la Padmanabhan et al. (2008). Further motivating consideration of a wider area, the *XMM-Newton* Extended Survey of the Taurus Molecular Cloud program (Güdel et al. 2007a, and references therein) mapped $\sim 5 \text{ deg}^2$, most but not all of which was covered by our *Spitzer* maps. Finally, as seen in Figure 1, Kenyon et al. (2008) include a list of known Taurus members, many of which are well beyond the bounds of our original *Spitzer* survey, and Slesnick et al. (2006) report on several more candidate Taurus members.

We define a polygon in which we searched for YSO candidates using *WISE* that encompasses all of the members from Kenyon et al. (2008), a few of the potential members from Slesnick et al. (2006), and all of the Sloan coverage to the north of our previous *Spitzer* survey. The R.A./decl. vertices of this polygon are in degrees: 77.4 31, 77.4 20.5, 74 20.5, 74 16.5, 66 16.5, 66 15, 64 15, 64 19.8, 59.5 19.8, 57.7 24.5, 58.5 32.3, 63.8 32.3, 63.8 37, 66.8 37, 66.81 32.93, 77.30 32.77. The total area we have considered is $\sim 260 \text{ deg}^2$.

This area is so large that we need to consider other star-forming regions very nearby (in projection) to Taurus. Figure 2 shows our polygon on an *IRAS* 100 μm image of the region. NGC 1579 is the bright knot in the central north of the image; this is thought to be 700 pc away (Herbig et al. 2004), too far to be part of Taurus at 140 pc. Lynds 1548 and environs will be discussed in a forthcoming paper by W. Liu et al. (2012, in preparation). Our polygon intersects with the tidal radius of the Pleiades ($\sim 6^\circ$; Adams et al. 2001). Young objects identified within our polygon and within $\sim 6^\circ$ of the Pleiades could belong to the Pleiades and not Taurus.

WISE data acquisition and reduction are discussed in Wright et al. (2010), Jarrett et al. (2011), and in the Explanatory Supplement to the *WISE* Preliminary Data Release Products. There are four *WISE* bands, with central wavelengths at 3.4, 4.6, 12, and 22 μm , and a spatial resolution of $6''$ ($12''$ at 22 μm). The four bands are often referred to as W1, W2, W3, and W4. We rejected any source with contamination and confusion flags (“cc_flags” in the catalog) that include any of the characters “DHOP” in its four-character string as likely contamination or confusion artifacts.¹¹ This process resulted in a catalog containing about 2.38 million sources. The *WISE* catalog reports S/Ns. We further restricted ourselves to those measurements with $\text{S/N} > 7$ in all four bands, drastically shrinking the catalog to ~ 7000 sources. Our initial attempts limited the analysis to those measurements with $\text{S/N} > 7$ in just the first three bands, but given the expected brightness of Taurus members, plus the contamination rate we expect based on our experience with *Spitzer* in Taurus, we opted to enforce the S/N cut in W4 as well so as to limit the contamination in our list of candidate YSOs.

The *WISE* catalog reports flux measurements in magnitudes with errors in magnitudes, and the source selection in this paper

¹¹ “D” denotes diffraction spike, “H” indicates that the source is spurious as a result of, or contaminated by, the scattered light halo surrounding a nearby bright source, “O” denotes optical ghost, and “P” denotes persistence artifact.

Figure 2. Overlaid on an *IRAS* 100 μ m map, the location in the sky of our survey contour (red polygon), other nearby star-forming regions of interest, and the tidal radius of the Pleiades (green circle). L1548 will be discussed by W. Liu et al. (2012, in preparation). Some of our objects are within the tidal radius of the Pleiades and thus perhaps could be members of the Pleiades rather than Taurus. NGC 1579 is centered on the bright spot.

was based on these magnitudes. The zero points we used to convert between magnitudes and flux densities in the spectral energy distribution (SED) plots included in the complete figure set of Figure 12 in the Appendix are 309.54, 171.79, 31.676, and 8.3635 Jy for the four channels, respectively, based on the zero points in Wright et al. (2010) and the flux correction factors for a spectrum with constant F_ν . These zero points are also used by Jarrett et al. (2011).

The *WISE* bands are merged among themselves and to the Two Micron All Sky Survey (2MASS; Skrutskie et al. 2006) in the data products provided by the *WISE* archive housed at the Infrared Science Archive. We merged this catalog to our already-assembled catalog of ancillary data via a strictly position-based search with a 1'' radius. As noted in Section VI.5.f of the *WISE* Explanatory Supplement, the *WISE* catalog reports positions of sources brighter than $W1 < 13.0$ mag to 0.2 arcsec (1σ) relative to 2MASS positions. The positions reported for fainter sources may suffer from a systematic error up to 1'' in declination due to a pipeline coding error.

3. IDENTIFYING THE YSO CANDIDATES

The process of identifying the YSO candidates is a multi-step process, beginning with color cuts and progressing through

ancillary data, including manual checks of SEDs and images. We now describe the process that we used.

3.1. Initial Cut

We started with our extracted *WISE* catalog over the ~ 260 deg² polygon specified above and applied the color cuts discussed in Koenig et al. (2011). In summary, there are a series of cuts in multiple color spaces based on the location of previously identified YSOs and galaxies. These are intended statistically to weed out most contaminants and find most YSOs. No color cuts can perform this task flawlessly, though many have been discussed in the literature in the context of *Spitzer* observations (e.g., Allen et al. 2004; Padgett et al. 2008a; Rebull et al. 2007, 2010, 2011; Harvey et al. 2007; Gutermuth et al. 2008, 2009). As discussed in Rebull et al. (2010), especially over very large fields like Taurus, where the molecular cloud does not block out most background sources and where the survey area is big enough that the chances of obtaining more unusual objects are greater, the contamination rate for any color selection is expected to be relatively large, and ancillary data are crucial for culling the list to high-quality candidates.

The color cuts described in Koenig et al. (2011) are inspired by Gutermuth et al. (2008, 2009) and Rebull et al. (2010) and applied using *WISE*+2MASS colors. For their full selection

process, Koenig et al. (2011) estimate a contamination rate for “typical” star-forming regions of about 2.4 objects resembling Class Is, 3.8 objects resembling Class IIs, and 1.8 objects resembling transition disks per square degree. At this rate, with our ~ 260 deg² map, we expect ~ 620 , ~ 990 , and ~ 470 , respectively, for a rough total of ~ 2000 contaminants per square degree. As a check, we recalculated these contamination rates for a ~ 10 deg² patch at the north and south equatorial poles, and obtained values between ~ 1500 and ~ 1600 contaminants per square degree. However, these values are sensitive to relative depths of *WISE* coverage (deeper at the poles than the ecliptic), any bright extended emission in the image (present here but less so in the extragalactic fields), and natural variability in the space density of stars and galaxies.

We initially applied the Koenig et al. method to the *WISE* catalog where the S/N is at least 7 in channels 1, 2, and 3, but not necessarily 4. We thus obtained ~ 1760 YSO candidates. Given the contamination rates expected above, we thus anticipate a high fraction of contaminants in this list. As mentioned above, given the expected brightness of Taurus members, plus the contamination rate we expect based on our experience with *Spitzer* in Taurus, we chose to impose an S/N cut in W4 as well so as to limit the contamination in our list of candidate YSOs. Imposing our additional requirement that the S/N is at least 7 in all four *WISE* channels results in a pool of 1014 potential YSOs.

3.2. Ancillary Data

We know from our *Spitzer* search for new members of Taurus that ancillary data are very important for weeding the contaminants out from the list of potential YSO candidates. So, in addition to our catalog above, we have included the information from ancillary data in our assembly of our final YSO candidate list in an effort to limit the contamination.

We have matched our *WISE* catalog to the full SDSS catalog (from DR8) in this region (which includes extended source information from the images) and the 2MASS Extended Source Catalog. Objects that are extended are likely to be (though are not guaranteed to be) galaxies; see the discussion in Rebull et al. (2010). There are also $\sim 11,500$ SDSS spectra in the SDSS stripes; just 27 of the sources in our list of potential YSOs find matches with SDSS spectra.

We merged to the *Akari* 9 and 18 μ m Infrared Camera (IRC) all-sky point-source catalog (Ishihara et al. 2010). There are ~ 3000 sources in this region, ~ 100 of which match to the *WISE*-selected sources, $\sim 80\%$ of which are for previously known Taurus members.

Based on our experience with our Taurus *Spitzer* Survey, we know that the YSOs are generally though not exclusively found in regions of high A_V . Thus, we expect that an estimate of A_V toward our new candidates in this larger region will also be useful in weeding out contaminants. Froebrich et al. (2007) report on a large, 127×63 deg² extinction map based on 2MASS data. We used this map to estimate A_V toward our list of candidates. This map is calculated to a $\sim 4'$ resolution, and we used a 3×3 pixel ($6' \times 6'$) median calculated about the position of each source to estimate the A_V .

3.3. Previously Identified YSOs

For the 1014 potential YSOs selected from *WISE*+2MASS color and magnitude cuts imposed on the 2.38 million sources with good S/N photometry, 196 of them have matches to previously identified stars with indications of youth and/or infrared

excesses, in the direction of Taurus. Table 1 lists these objects and their *WISE* measurements. Most of the objects in Table 1 are previously identified explicitly as Taurus members in Güdel et al. (2007a) and references therein, Kenyon et al. (2008), Rebull et al. (2010), and/or Luhman et al. (2010). Eighteen of the objects in Table 1 are listed as unconfirmed candidates in Rebull et al. (2010); these are identified as such in the “notes” column of Table 1. (As discussed in Rebull et al. 2010, for these objects, we could not find unambiguous spectroscopic indications of youth—such as the H α emission line was low or absent—so additional data are needed to confirm or refute these objects as Taurus members. These objects should not be regarded as Taurus members with the same confidence as, e.g., DG Tau, but they are not necessarily clearly field interlopers either.) The candidates from Slesnick et al. (2006) would have been similarly indicated, except they are largely not recovered, save for three objects commonly taken as Taurus members (SCHJ0429595+2433080 = CFHT-20, SCHJ0438586+2336352 = J0438586+2336352, and SCHJ0439016+2336030 = J0439016+2336030). Eight of the objects in Table 1 are not traditionally identified as Taurus members, but we recover them as having IR excess, and they appear in the literature as having some indications of youth and with appropriate proper motions for Taurus members (2MASS J04360131+1726120, 2MASS J04324107+1809239, HD 285893, HBHA 3214-06, GZ Aur, BS Tau, IRAS 05020+2518, HO Aur). These are also indicated in Table 1 in the “notes” column.

Note that this table is not meant to be a complete list of Taurus members detected with *WISE*, but instead a list of all objects in the direction of Taurus, identified as young, detected in *WISE* with S/N > 7 in all four bands and identified using the Koenig et al. (2011) method as having an IR excess. Some bona fide members of Taurus are either too faint or do not have enough color excess to be identified in this manner.

3.4. Manual Inspection

For the remaining 818 *WISE*-identified IR excess objects that have not been associated previously with young stars, we conducted a preliminary sorting into “likely contaminant” or “perhaps YSO” bins. The categorization was based on matches to objects in SIMBAD (and literature therein), matches to objects we identified as contaminants in Rebull et al. (2010), matches to the 2MASS Extended Source Catalog, and identification as extended in the SDSS pipeline. We then generated SEDs using all photometric data in our database for these objects and inspected each of them. Based on our experience, we then categorized each of the objects as still possible YSO candidates, or likely extragalactic objects. This classification is easier when there are more photometric bands; objects for which there are SDSS, 2MASS, and *WISE* photometry are more likely appropriately classified during this process than those without optical photometry or with just *WISE* photometry. Therefore, this process may have dropped viable YSO candidates similar to, e.g., MHO-1 or Haro 6-39, which have very flat SEDs (and moreover MHO-1 has just *WISE* photometry). Statistically the objects we have dropped on this basis are very likely to be extragalactic. Because this process is not perfect, the objects dropped as a result of SED shape are identified in the “notes” column of the tables below specifically so that follow-up optical photometry (for example) can be obtained.

After this process, there were ~ 130 objects which we could not yet reject as YSO candidates. For these objects, we inspected the images in all four *WISE* bands, and, if necessary, 2MASS,

Table 1
Multiband Measurements of *WISE*-identified YSOs with Previous Indications of Youth in the Literature towards the Taurus Region^a

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
1	J040443.06+261856.3	IRAS 04016+26102	7.67 $\pm$ 0.03	5.16 $\pm$ 0.03	2.91 $\pm$ 0.02	0.01 $\pm$ 0.02	
2	J041339.46+292113.8	None	12.78 $\pm$ 0.03	11.74 $\pm$ 0.02	9.43 $\pm$ 0.04	7.40 $\pm$ 0.11	Still a candidate YSO ^b
3	J041353.28+281123.1	IRAS 04108+2803 A	9.44 $\pm$ 0.02	8.28 $\pm$ 0.02	5.47 $\pm$ 0.02	3.60 $\pm$ 0.02	
4	J041354.70+281132.6	IRAS 04108+2803 B	9.44 $\pm$ 0.02	7.36 $\pm$ 0.02	4.33 $\pm$ 0.02	1.46 $\pm$ 0.01	
5	J041357.37+291819.1	IRAS 04108+2910	8.00 $\pm$ 0.02	6.98 $\pm$ 0.02	4.96 $\pm$ 0.02	2.97 $\pm$ 0.02	
6	J041412.29+280837.1	IRAS 04111+2800G	13.86 $\pm$ 0.03	11.73 $\pm$ 0.03	8.97 $\pm$ 0.03	4.03 $\pm$ 0.02	
7	J041412.91+281212.3	V773 Tau ABC	6.64 $\pm$ 0.02	5.87 $\pm$ 0.02	3.87 $\pm$ 0.02	1.91 $\pm$ 0.01	
8	J041413.58+281249.0	FM Tau	8.07 $\pm$ 0.02	7.48 $\pm$ 0.02	5.21 $\pm$ 0.02	3.03 $\pm$ 0.03	
9	J041414.59+282757.9	FN Tau	7.48 $\pm$ 0.03	6.78 $\pm$ 0.02	4.09 $\pm$ 0.02	1.96 $\pm$ 0.02	
10	J041417.61+280609.5	CIDA-1	9.05 $\pm$ 0.02	8.17 $\pm$ 0.02	5.49 $\pm$ 0.02	3.56 $\pm$ 0.03	
11	J041426.31+280601.9	MHO-1	6.16 $\pm$ 0.04	4.81 $\pm$ 0.03	2.79 $\pm$ 0.02	0.44 $\pm$ 0.01	
12	J041430.55+280514.4	MHO-3	6.95 $\pm$ 0.03	5.70 $\pm$ 0.03	2.58 $\pm$ 0.02	0.24 $\pm$ 0.02	
13	J041447.30+264626.3	FP Tau	8.39 $\pm$ 0.02	7.95 $\pm$ 0.02	6.47 $\pm$ 0.02	4.43 $\pm$ 0.03	
14	J041447.86+264810.9	CX Tau	8.51 $\pm$ 0.02	8.04 $\pm$ 0.02	5.65 $\pm$ 0.02	3.45 $\pm$ 0.02	
15	J041449.28+281230.4	FO Tau AB	7.42 $\pm$ 0.03	6.91 $\pm$ 0.02	5.11 $\pm$ 0.02	3.05 $\pm$ 0.02	
16	J041535.66+284741.3	None	13.61 $\pm$ 0.03	12.00 $\pm$ 0.03	9.29 $\pm$ 0.04	5.84 $\pm$ 0.04	Still a candidate YSO ^b
17	J041539.16+281858.3	041539.1+281858	8.77 $\pm$ 0.02	8.33 $\pm$ 0.02	6.86 $\pm$ 0.02	4.44 $\pm$ 0.03	
18	J041542.77+290959.1	041542.7+290959	9.04 $\pm$ 0.02	8.91 $\pm$ 0.02	8.57 $\pm$ 0.03	4.76 $\pm$ 0.02	
19	J041558.00+274617.2	041557.9+274617	9.85 $\pm$ 0.02	9.33 $\pm$ 0.02	7.47 $\pm$ 0.02	5.86 $\pm$ 0.04	
20	J041604.83+261800.9	None	12.36 $\pm$ 0.03	11.28 $\pm$ 0.02	8.68 $\pm$ 0.03	6.61 $\pm$ 0.07	Still a candidate YSO ^b
21	J041612.10+275638.3	J04161210+2756385	9.47 $\pm$ 0.03	8.86 $\pm$ 0.02	7.68 $\pm$ 0.02	5.56 $\pm$ 0.04	
22	J041639.12+285848.8	J04163911+2858491	10.58 $\pm$ 0.02	10.07 $\pm$ 0.02	8.86 $\pm$ 0.03	7.29 $\pm$ 0.12	(SDSS spectrum: STAR -M8)
23	J041749.55+281331.5	KPNO-10	11.38 $\pm$ 0.02	10.55 $\pm$ 0.02	8.01 $\pm$ 0.02	6.04 $\pm$ 0.05	(SDSS spectrum: STAR -M6)
24	J041749.65+282936.0	V410 X-ray 1	8.43 $\pm$ 0.02	7.76 $\pm$ 0.02	5.49 $\pm$ 0.02	3.83 $\pm$ 0.03	
25	J041803.37+244009.6	041803.3+244009	10.01 $\pm$ 0.03	10.01 $\pm$ 0.02	9.39 $\pm$ 0.04	7.33 $\pm$ 0.11	Still a candidate YSO ^b
26	J041810.60+284447.0	None	12.66 $\pm$ 0.03	11.59 $\pm$ 0.02	9.11 $\pm$ 0.04	6.58 $\pm$ 0.07	Still a candidate YSO ^b
27	J041810.78+251957.2	[GBM90]L15061	8.32 $\pm$ 0.02	7.93 $\pm$ 0.02	5.54 $\pm$ 0.02	3.81 $\pm$ 0.02	
28	J041817.10+282841.6	V410 Anon 13	10.52 $\pm$ 0.03	9.84 $\pm$ 0.02	7.97 $\pm$ 0.02	6.15 $\pm$ 0.05	
29	J041823.20+251928.0	2MASX04182321+2519281	11.92 $\pm$ 0.03	10.90 $\pm$ 0.02	8.43 $\pm$ 0.03	6.28 $\pm$ 0.05	Still a candidate YSO ^b
30	J041831.12+281628.8	DD Tau AB	6.83 $\pm$ 0.03	5.78 $\pm$ 0.02	3.72 $\pm$ 0.02	1.80 $\pm$ 0.02	
31	J041831.60+281658.3	CZ Tau AB	8.65 $\pm$ 0.02	7.49 $\pm$ 0.02	3.85 $\pm$ 0.02	2.13 $\pm$ 0.02	
32	J041832.03+283115.1	IRAS 04154+2823	7.78 $\pm$ 0.02	6.52 $\pm$ 0.02	4.28 $\pm$ 0.02	1.99 $\pm$ 0.02	
33	J041834.44+283030.0	V410 X-ray 2	8.65 $\pm$ 0.02	8.01 $\pm$ 0.02	6.72 $\pm$ 0.02	3.58 $\pm$ 0.02	
34	J041841.32+282724.7	LR1	9.98 $\pm$ 0.02	8.93 $\pm$ 0.02	7.48 $\pm$ 0.03	4.82 $\pm$ 0.03	
35	J041851.47+282026.2	CoKu Tau/1	10.27 $\pm$ 0.02	8.47 $\pm$ 0.02	3.84 $\pm$ 0.02	1.01 $\pm$ 0.02	(SDSS spectrum: GALAXY-STARBURST)
36	J041858.07+235030.8	None	12.95 $\pm$ 0.03	11.78 $\pm$ 0.02	9.28 $\pm$ 0.04	7.41 $\pm$ 0.12	Still a candidate YSO ^b
37	J041858.13+281223.1	IRAS 04158+2805	9.47 $\pm$ 0.03	8.32 $\pm$ 0.02	5.70 $\pm$ 0.02	2.99 $\pm$ 0.02	
38	J041858.99+255740.0	None	13.37 $\pm$ 0.03	11.98 $\pm$ 0.02	8.64 $\pm$ 0.03	6.06 $\pm$ 0.04	Still a candidate YSO ^b
39	J041901.10+281941.8	V410 X-ray 6	8.98 $\pm$ 0.03	8.64 $\pm$ 0.02	7.20 $\pm$ 0.02	3.89 $\pm$ 0.03	
40	J041915.83+290626.6	BP Tau	7.08 $\pm$ 0.03	6.64 $\pm$ 0.02	4.78 $\pm$ 0.02	2.74 $\pm$ 0.02	
41	J041935.46+282721.4	FR Tau	9.55 $\pm$ 0.03	8.77 $\pm$ 0.02	6.33 $\pm$ 0.02	4.86 $\pm$ 0.03	
42	J041940.48+270100.7	None	13.16 $\pm$ 0.03	11.94 $\pm$ 0.03	9.21 $\pm$ 0.05	6.88 $\pm$ 0.10	Still a candidate YSO ^b
43	J041941.49+271606.8	HH390 star	11.65 $\pm$ 0.03	10.36 $\pm$ 0.02	7.43 $\pm$ 0.02	3.25 $\pm$ 0.02	
44	J041946.58+271255.0	J04194657+2712552	10.81 $\pm$ 0.03	9.36 $\pm$ 0.02	7.05 $\pm$ 0.02	4.14 $\pm$ 0.03	
45	J041958.45+270957.0	IRAS 04169+2702	8.90 $\pm$ 0.02	6.96 $\pm$ 0.02	3.93 $\pm$ 0.02	0.81 $\pm$ 0.02	

Table 1
(Continued)

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
46	J042025.55+270035.4	J04202555+2700355	11.19 $\pm$ 0.03	10.71 $\pm$ 0.02	8.64 $\pm$ 0.03	6.14 $\pm$ 0.06	(SDSS spectrum: STAR -M7)
47	J042025.83+281923.5	J04202583+2819237	9.45 $\pm$ 0.02	8.38 $\pm$ 0.02	6.01 $\pm$ 0.02	4.05 $\pm$ 0.03	
48	J042026.06+280408.8	J04202606+2804089	9.46 $\pm$ 0.03	9.07 $\pm$ 0.02	6.53 $\pm$ 0.02	3.73 $\pm$ 0.03	
49	J042107.96+270220.3	CFHT-19	8.02 $\pm$ 0.02	6.87 $\pm$ 0.02	4.22 $\pm$ 0.02	1.84 $\pm$ 0.02	
50	J042110.39+270137.1	IRAS 04181+2654B	9.57 $\pm$ 0.02	8.12 $\pm$ 0.02	5.66 $\pm$ 0.02	2.87 $\pm$ 0.02	
51	J042111.46+270109.3	IRAS 04181+2654A	9.03 $\pm$ 0.03	7.57 $\pm$ 0.02	4.84 $\pm$ 0.02	1.78 $\pm$ 0.02	
52	J042143.23+193413.2	04187+1927	7.08 $\pm$ 0.03	6.14 $\pm$ 0.02	3.66 $\pm$ 0.02	1.94 $\pm$ 0.02	
53	J042155.63+275505.9	DE Tau	7.07 $\pm$ 0.03	6.53 $\pm$ 0.02	4.86 $\pm$ 0.02	2.80 $\pm$ 0.03	
54	J042159.44+193205.9	TTau	3.86 $\pm$ 0.06	2.20 $\pm$ 0.01	0.10 $\pm$ 0.00	-2.13 $\pm$ 0.02	
55	J042200.42+153021.2	2MASX04220037+1530212	10.51 $\pm$ 0.03	8.35 $\pm$ 0.02	5.34 $\pm$ 0.01	2.35 $\pm$ 0.03	
56	J042247.87+264552.7	IRAS 04196+2638	8.14 $\pm$ 0.02	7.36 $\pm$ 0.02	5.49 $\pm$ 0.07	3.27 $\pm$ 0.03	
57	J042307.77+280557.1	IRAS 04200+2759	8.80 $\pm$ 0.02	7.98 $\pm$ 0.02	5.52 $\pm$ 0.02	3.38 $\pm$ 0.03	(SDSS spectrum: STAR -M2)
58	J042335.39+250302.5	FUTau	8.62 $\pm$ 0.02	7.85 $\pm$ 0.02	6.05 $\pm$ 0.02	4.65 $\pm$ 0.03	(SDSS spectrum: STAR -M8)
59	J042444.58+261014.0	IRAS 04216+2603	8.09 $\pm$ 0.02	7.36 $\pm$ 0.02	5.41 $\pm$ 0.02	3.49 $\pm$ 0.02	
60	J042457.08+271156.2	IP Tau	7.75 $\pm$ 0.02	7.26 $\pm$ 0.02	5.38 $\pm$ 0.02	3.59 $\pm$ 0.03	
61	J042519.16+234716.7	HD27923	7.54 $\pm$ 0.03	7.57 $\pm$ 0.02	7.58 $\pm$ 0.02	1.33 $\pm$ 0.01	Still a candidate YSO ^b
62	J042629.39+262413.4	KPNO-3	11.56 $\pm$ 0.03	10.94 $\pm$ 0.02	8.76 $\pm$ 0.03	6.91 $\pm$ 0.09	(SDSS spectrum: STAR -M8)
63	J042653.50+260654.1	FV Tau AB	6.78 $\pm$ 0.03	5.58 $\pm$ 0.02	3.21 $\pm$ 0.01	1.37 $\pm$ 0.01	
64	J042656.25+244335.1	IRAS 04239+2436	8.13 $\pm$ 0.02	6.05 $\pm$ 0.02	3.12 $\pm$ 0.02	0.17 $\pm$ 0.03	
65	J042657.31+260628.1	KPNO-13	8.94 $\pm$ 0.03	8.27 $\pm$ 0.02	6.50 $\pm$ 0.03	4.95 $\pm$ 0.08	(SDSS spectrum: STAR -M7)
66	J042702.56+260530.4	DGTauB	8.97 $\pm$ 0.03	6.71 $\pm$ 0.02	3.41 $\pm$ 0.02	0.78 $\pm$ 0.02	
67	J042702.79+254222.2	DF Tau AB	5.89 $\pm$ 0.05	5.03 $\pm$ 0.03	3.80 $\pm$ 0.02	2.31 $\pm$ 0.02	
68	J042704.69+260615.9	DG Tau A	6.18 $\pm$ 0.04	4.98 $\pm$ 0.03	2.26 $\pm$ 0.01	-0.19 $\pm$ 0.02	
69	J042730.27+244123.6	2MASX04273023+2441232	11.75 $\pm$ 0.03	11.49 $\pm$ 0.03	8.35 $\pm$ 0.03	6.31 $\pm$ 0.10	Still a candidate YSO ^b
70	J042757.31+261918.1	IRAS 04248+2612 AB	9.81 $\pm$ 0.02	8.75 $\pm$ 0.02	5.45 $\pm$ 0.02	2.35 $\pm$ 0.01	
71	J042810.38+243553.7	None	13.99 $\pm$ 0.03	12.44 $\pm$ 0.03	9.79 $\pm$ 0.05	7.61 $\pm$ 0.16	Still a candidate YSO ^b
72	J042842.62+2711403.5	J04284263+2714039 AB	9.79 $\pm$ 0.02	9.37 $\pm$ 0.02	8.09 $\pm$ 0.03	6.18 $\pm$ 0.05	
73	J042904.98+264907.1	IRAS 04260+2642	10.57 $\pm$ 0.02	9.53 $\pm$ 0.02	7.00 $\pm$ 0.02	3.65 $\pm$ 0.02	
74	J042920.82+274207.3	IRAS 04262+2735	6.55 $\pm$ 0.04	6.34 $\pm$ 0.02	3.84 $\pm$ 0.02	3.02 $\pm$ 0.02	
75	J042921.65+270125.7	IRAS 04263+2654	8.27 $\pm$ 0.03	7.62 $\pm$ 0.02	5.77 $\pm$ 0.02	3.50 $\pm$ 0.02	
76	J042923.73+243300.9	GV Tau AB	5.95 $\pm$ 0.04	3.24 $\pm$ 0.04	0.30 $\pm$ 0.00	-1.63 $\pm$ 0.01	(SDSS spectrum: GALAXY-STARBURST)
77	J042930.08+243954.9	IRAS 04264+2433	10.28 $\pm$ 0.02	9.05 $\pm$ 0.02	4.35 $\pm$ 0.02	1.13 $\pm$ 0.01	
78	J042932.08+243059.4	None	11.06 $\pm$ 0.03	9.20 $\pm$ 0.02	6.29 $\pm$ 0.02	4.04 $\pm$ 0.04	
79	J042936.06+243555.4	J04293606+2435556	8.12 $\pm$ 0.02	7.64 $\pm$ 0.02	6.39 $\pm$ 0.02	4.44 $\pm$ 0.03	
80	J042941.55+263258.0	DH Tau AB	7.42 $\pm$ 0.03	6.99 $\pm$ 0.02	5.73 $\pm$ 0.02	3.07 $\pm$ 0.02	
81	J042951.55+260644.7	IQ Tau	7.21 $\pm$ 0.03	6.67 $\pm$ 0.02	4.87 $\pm$ 0.02	3.01 $\pm$ 0.02	
82	J042954.22+175403.8	04295422+1754041	10.12 $\pm$ 0.02	9.47 $\pm$ 0.02	8.13 $\pm$ 0.03	6.42 $\pm$ 0.06	
83	J042959.50+243307.5	CFHT-20	9.09 $\pm$ 0.02	8.45 $\pm$ 0.02	6.84 $\pm$ 0.02	4.88 $\pm$ 0.03	(SDSS spectrum: STAR -M8)
84	J043003.99+181349.4	UXTau	6.99 $\pm$ 0.03	6.61 $\pm$ 0.02	5.69 $\pm$ 0.01	2.17 $\pm$ 0.02	
85	J043029.62+242644.9	FX Tau AB	7.49 $\pm$ 0.03	7.09 $\pm$ 0.02	5.09 $\pm$ 0.02	3.23 $\pm$ 0.02	
86	J043044.25+260124.4	DK Tau AB	6.12 $\pm$ 0.04	5.38 $\pm$ 0.03	3.59 $\pm$ 0.01	1.84 $\pm$ 0.01	
87	J043051.38+244222.2	ZZ Tau AB	8.09 $\pm$ 0.02	7.66 $\pm$ 0.02	5.94 $\pm$ 0.02	4.33 $\pm$ 0.03	
88	J043051.71+244147.4	ZZ Tau IRS	9.01 $\pm$ 0.02	7.16 $\pm$ 0.02	4.43 $\pm$ 0.02	1.95 $\pm$ 0.02	
89	J043134.12+180804.9	2MASX04313407+1808048	7.75 $\pm$ 0.02	5.55 $\pm$ 0.02	0.86 $\pm$ 0.01	-2.37 $\pm$ 0.01	
90	J043136.14+181343.1	LkHa358	8.17 $\pm$ 0.02	7.16 $\pm$ 0.02	4.96 $\pm$ 0.02	2.39 $\pm$ 0.03	
91	J043138.42+181357.6	HLTau	5.42 $\pm$ 0.05	3.34 $\pm$ 0.03	1.52 $\pm$ 0.01	-1.23 $\pm$ 0.01	
92	J043140.09+181357.0	XZTau	5.90 $\pm$ 0.05	4.64 $\pm$ 0.04	2.65 $\pm$ 0.02	0.53 $\pm$ 0.02	

Table 1
(Continued)

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
93	J043144.47+180831.4	L1551NE	9.31 $\pm$ 0.02	6.88 $\pm$ 0.02	4.18 $\pm$ 0.02	0.15 $\pm$ 0.02	
94	J043150.56+242417.6	HK Tau AB	7.81 $\pm$ 0.03	7.35 $\pm$ 0.02	5.49 $\pm$ 0.02	2.46 $\pm$ 0.02	
95	J043157.79+182136.9	V710Tau	7.55 $\pm$ 0.02	7.14 $\pm$ 0.02	5.54 $\pm$ 0.02	3.76 $\pm$ 0.03	
96	J043159.68+182130.3	J04315968+1821305	8.84 $\pm$ 0.02	7.98 $\pm$ 0.02	6.55 $\pm$ 0.02	4.73 $\pm$ 0.03	
97	J043215.41+242859.5	Haro6-13	6.63 $\pm$ 0.03	5.80 $\pm$ 0.03	3.60 $\pm$ 0.02	0.89 $\pm$ 0.01	
98	J043216.06+181246.3	MHO5	9.61 $\pm$ 0.03	9.03 $\pm$ 0.02	7.01 $\pm$ 0.02	5.70 $\pm$ 0.05	
99	J043222.11+182742.6	MHO6	10.22 $\pm$ 0.02	9.76 $\pm$ 0.02	8.45 $\pm$ 0.03	6.63 $\pm$ 0.08	
100	J043224.15+225108.2	043224.1+225108	10.17 $\pm$ 0.02	9.62 $\pm$ 0.02	7.60 $\pm$ 0.02	6.20 $\pm$ 0.05	
101	J043230.35+173140.6	GGTauAa	6.67 $\pm$ 0.03	6.13 $\pm$ 0.02	4.08 $\pm$ 0.01	2.13 $\pm$ 0.01	
102	J043230.57+241957.3	FY Tau	7.31 $\pm$ 0.03	6.78 $\pm$ 0.03	5.58 $\pm$ 0.02	4.03 $\pm$ 0.02	
103	J043232.06+225726.3	IRAS 04295+2251	8.61 $\pm$ 0.02	6.84 $\pm$ 0.02	3.90 $\pm$ 0.02	1.53 $\pm$ 0.02	
104	J043241.08+180923.8	2MASSJ04324107+1809239	9.86 $\pm$ 0.03	9.36 $\pm$ 0.02	8.00 $\pm$ 0.02	6.55 $\pm$ 0.08	Known YSO but not traditional Taurus member
105	J043243.00+255230.8	UZ Tau Aab	6.36 $\pm$ 0.04	5.72 $\pm$ 0.02	3.66 $\pm$ 0.02	1.85 $\pm$ 0.02	
106	J043249.11+225302.7	JH112	7.41 $\pm$ 0.03	6.88 $\pm$ 0.02	4.69 $\pm$ 0.02	2.68 $\pm$ 0.02	
107	J043304.22+292149.9	HD282276	7.87 $\pm$ 0.02	7.71 $\pm$ 0.02	5.76 $\pm$ 0.02	2.62 $\pm$ 0.02	Still a candidate YSO ^b
108	J043306.21+240933.7	GH Tau AB	7.34 $\pm$ 0.03	6.87 $\pm$ 0.02	5.28 $\pm$ 0.02	3.28 $\pm$ 0.02	
109	J043306.62+240954.9	V807 Tau AB	6.51 $\pm$ 0.04	6.14 $\pm$ 0.02	5.16 $\pm$ 0.02	2.97 $\pm$ 0.02	
110	J043314.36+261423.2	IRAS 04301+2608	11.98 $\pm$ 0.02	11.13 $\pm$ 0.02	7.14 $\pm$ 0.02	3.55 $\pm$ 0.02	
111	J043316.47+225320.4	IRAS 04302+2247	10.24 $\pm$ 0.02	9.34 $\pm$ 0.02	8.83 $\pm$ 0.03	3.99 $\pm$ 0.02	
112	J043316.60+262724.3	None	13.39 $\pm$ 0.03	12.33 $\pm$ 0.03	9.64 $\pm$ 0.05	7.12 $\pm$ 0.10	Still a candidate YSO ^b
113	J043332.80+180043.4	None	9.38 $\pm$ 0.03	8.93 $\pm$ 0.02	6.46 $\pm$ 0.02	4.72 $\pm$ 0.03	
114	J043334.06+242117.0	GI Tau	7.10 $\pm$ 0.03	6.37 $\pm$ 0.02	4.01 $\pm$ 0.02	2.54 $\pm$ 0.03	
115	J043334.55+242105.9	GK Tau	6.42 $\pm$ 0.04	5.80 $\pm$ 0.03	3.70 $\pm$ 0.02	1.55 $\pm$ 0.02	
116	J043336.80+260949.0	IS Tau AB	8.06 $\pm$ 0.02	7.41 $\pm$ 0.02	5.24 $\pm$ 0.02	3.74 $\pm$ 0.02	
117	J043339.06+222720.6	043339.0+222720	10.16 $\pm$ 0.02	9.73 $\pm$ 0.02	8.06 $\pm$ 0.03	5.04 $\pm$ 0.03	
118	J043339.07+252038.0	DL Tau	6.98 $\pm$ 0.03	6.24 $\pm$ 0.02	4.31 $\pm$ 0.02	2.44 $\pm$ 0.02	
119	J043339.36+175152.1	HNTau	7.26 $\pm$ 0.03	6.41 $\pm$ 0.02	4.15 $\pm$ 0.02	2.18 $\pm$ 0.02	
120	J043341.73+175039.9	J04334171+1750402	10.07 $\pm$ 0.03	9.73 $\pm$ 0.02	8.37 $\pm$ 0.03	6.42 $\pm$ 0.08	
121	J043344.66+261500.3	J04334465+2615005	9.19 $\pm$ 0.03	8.41 $\pm$ 0.02	6.60 $\pm$ 0.02	4.78 $\pm$ 0.03	
122	J043348.73+181009.8	DMTau	9.47 $\pm$ 0.03	9.30 $\pm$ 0.02	7.04 $\pm$ 0.02	3.60 $\pm$ 0.02	
123	J043352.01+225030.0	CI Tau	6.78 $\pm$ 0.03	6.07 $\pm$ 0.02	4.34 $\pm$ 0.02	2.47 $\pm$ 0.02	
124	J043354.69+261327.0	IT Tau AB	7.45 $\pm$ 0.03	6.89 $\pm$ 0.02	5.22 $\pm$ 0.02	3.61 $\pm$ 0.02	
125	J043455.42+242852.9	AA Tau	7.43 $\pm$ 0.03	6.76 $\pm$ 0.02	4.62 $\pm$ 0.02	2.54 $\pm$ 0.02	
126	J043520.21+223214.4	HO Tau	8.97 $\pm$ 0.02	8.50 $\pm$ 0.02	6.88 $\pm$ 0.02	5.01 $\pm$ 0.03	
127	J043527.37+241458.7	DN Tau	7.78 $\pm$ 0.02	7.29 $\pm$ 0.02	5.12 $\pm$ 0.02	3.08 $\pm$ 0.02	
128	J043535.40+240819.9	IRAS 04325+2402 A	9.84 $\pm$ 0.02	8.72 $\pm$ 0.02	6.36 $\pm$ 0.02	1.64 $\pm$ 0.01	
129	J043540.95+241108.4	CoKu Tau/3 AB	7.54 $\pm$ 0.03	6.71 $\pm$ 0.02	4.78 $\pm$ 0.02	3.33 $\pm$ 0.02	
130	J043547.34+225021.6	HQTau	6.82 $\pm$ 0.03	6.11 $\pm$ 0.02	3.45 $\pm$ 0.02	1.54 $\pm$ 0.01	
131	J043552.78+225423.1	HP Tau AB	6.54 $\pm$ 0.04	5.86 $\pm$ 0.03	3.62 $\pm$ 0.02	1.47 $\pm$ 0.02	
132	J043556.83+225435.8	Haro 6-28 AB	8.83 $\pm$ 0.03	8.18 $\pm$ 0.02	6.31 $\pm$ 0.02	4.41 $\pm$ 0.03	
133	J043601.32+172611.9	2MASSJ04360131+1726120	8.62 $\pm$ 0.02	8.06 $\pm$ 0.02	7.16 $\pm$ 0.02	5.40 $\pm$ 0.04	Known YSO but not traditional Taurus member
134	J043630.81+184215.3	HD285893	7.16 $\pm$ 0.03	6.55 $\pm$ 0.02	3.73 $\pm$ 0.02	1.46 $\pm$ 0.01	Known YSO but not traditional Taurus member
135	J043642.05+265339.8	None	13.22 $\pm$ 0.03	11.49 $\pm$ 0.02	9.07 $\pm$ 0.03	6.47 $\pm$ 0.07	Still a candidate YSO ^b
136	J043756.70+254623.0	ITG 1	12.11 $\pm$ 0.03	11.29 $\pm$ 0.02	8.89 $\pm$ 0.03	7.07 $\pm$ 0.10	
137	J043814.87+261139.8	J04381486+2611399	11.10 $\pm$ 0.02	10.06 $\pm$ 0.02	7.87 $\pm$ 0.02	5.06 $\pm$ 0.03	
138	J043821.33+260913.6	GM Tau	9.52 $\pm$ 0.02	8.83 $\pm$ 0.02	7.07 $\pm$ 0.02	5.34 $\pm$ 0.04	

Table 1
(Continued)

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
139	J043828.58+261049.4	DO Tau	6.31 $\pm$ 0.04	5.42 $\pm$ 0.03	3.43 $\pm$ 0.02	1.20 $\pm$ 0.01	
140	J043835.31+261038.8	HV Tau AB	7.77 $\pm$ 0.02	7.51 $\pm$ 0.02	6.71 $\pm$ 0.02	3.62 $\pm$ 0.03	
141	J043858.60+233635.0	J0438586+2336352	10.72 $\pm$ 0.03	10.19 $\pm$ 0.02	8.32 $\pm$ 0.03	6.55 $\pm$ 0.07	
142	J043901.63+233602.7	J0439016+2336030	9.87 $\pm$ 0.02	9.46 $\pm$ 0.02	7.95 $\pm$ 0.02	6.39 $\pm$ 0.06	
143	J043903.95+254426.2	CFHT-6	10.98 $\pm$ 0.02	10.38 $\pm$ 0.02	8.33 $\pm$ 0.03	6.56 $\pm$ 0.07	(SDSS spectrum: STAR -M9)
144	J043905.24+233744.9	J04390525+2337450	10.63 $\pm$ 0.02	10.02 $\pm$ 0.02	7.28 $\pm$ 0.02	3.69 $\pm$ 0.03	
145	J043913.89+255320.9	IRAS 04361+2547 AB	8.68 $\pm$ 0.02	7.08 $\pm$ 0.02	2.76 $\pm$ 0.02	-1.01 $\pm$ 0.01	
146	J043917.42+224753.3	VYTau	8.49 $\pm$ 0.02	8.03 $\pm$ 0.02	6.19 $\pm$ 0.02	4.76 $\pm$ 0.03	
147	J043917.79+222103.3	LkCa 15	7.49 $\pm$ 0.03	7.15 $\pm$ 0.02	5.67 $\pm$ 0.02	3.60 $\pm$ 0.03	
148	J043920.91+254501.9	GN Tau B	7.13 $\pm$ 0.03	6.51 $\pm$ 0.02	4.88 $\pm$ 0.02	3.08 $\pm$ 0.02	
149	J043933.64+235921.0	J04393364+2359212	9.78 $\pm$ 0.02	9.15 $\pm$ 0.02	6.97 $\pm$ 0.02	5.26 $\pm$ 0.03	
150	J043935.18+254144.4	IRAS 04365+2535	7.96 $\pm$ 0.02	5.61 $\pm$ 0.03	3.42 $\pm$ 0.02	0.17 $\pm$ 0.01	
151	J043944.87+260152.6	ITG 15	8.41 $\pm$ 0.02	7.78 $\pm$ 0.02	6.26 $\pm$ 0.02	4.09 $\pm$ 0.03	
152	J043947.47+260140.6	CFHT-4	9.83 $\pm$ 0.03	8.97 $\pm$ 0.02	6.99 $\pm$ 0.02	5.17 $\pm$ 0.04	(SDSS spectrum: STAR -M9)
153	J043953.96+260309.7	IRAS 04368+2557	13.03 $\pm$ 0.05	9.75 $\pm$ 0.03	8.74 $\pm$ 0.04	3.12 $\pm$ 0.02	
154	J044000.67+235820.9	J04400067+2358211	11.15 $\pm$ 0.04	10.66 $\pm$ 0.03	8.91 $\pm$ 0.03	6.63 $\pm$ 0.07	
155	J044007.99+260525.3	IRAS 04370+2559	8.21 $\pm$ 0.02	7.27 $\pm$ 0.02	4.85 $\pm$ 0.02	2.74 $\pm$ 0.02	
156	J044049.50+255119.1	JH223	8.90 $\pm$ 0.02	8.43 $\pm$ 0.02	7.07 $\pm$ 0.02	5.30 $\pm$ 0.04	
157	J044108.26+255607.3	ITG 33 A	9.76 $\pm$ 0.02	8.87 $\pm$ 0.02	6.63 $\pm$ 0.02	4.50 $\pm$ 0.03	
158	J044110.78+255511.5	ITG 34	11.03 $\pm$ 0.03	10.31 $\pm$ 0.02	8.31 $\pm$ 0.04	6.71 $\pm$ 0.10	
159	J044112.68+254635.0	IRAS 04381+2540	9.85 $\pm$ 0.02	7.67 $\pm$ 0.02	4.85 $\pm$ 0.02	1.71 $\pm$ 0.02	
160	J044116.81+283959.8	CoKuTau4	8.50 $\pm$ 0.03	8.35 $\pm$ 0.02	6.66 $\pm$ 0.02	2.47 $\pm$ 0.02	
161	J044124.65+254352.7	ITG 40	10.78 $\pm$ 0.02	9.75 $\pm$ 0.02	8.29 $\pm$ 0.03	5.63 $\pm$ 0.04	
162	J044125.75+254349.3	IRA04412575+2543492	14.48 $\pm$ 0.04	12.33 $\pm$ 0.03	9.35 $\pm$ 0.04	7.05 $\pm$ 0.10	Still a candidate YSO ^b
163	J044138.82+255626.7	IRAS 04385+2550	8.16 $\pm$ 0.02	7.36 $\pm$ 0.02	4.55 $\pm$ 0.01	2.05 $\pm$ 0.01	
164	J044148.24+253430.4	J04414825+2534304	11.60 $\pm$ 0.03	10.78 $\pm$ 0.02	8.53 $\pm$ 0.03	6.29 $\pm$ 0.06	(SDSS spectrum: STAR -M9)
165	J044207.77+252311.5	V955 Tau Ab	6.96 $\pm$ 0.03	6.31 $\pm$ 0.02	4.49 $\pm$ 0.02	2.76 $\pm$ 0.02	
166	J044221.02+252034.2	CIDA-7	9.68 $\pm$ 0.03	9.03 $\pm$ 0.02	6.83 $\pm$ 0.02	4.38 $\pm$ 0.02	
167	J044237.68+251537.2	DP Tau	7.32 $\pm$ 0.03	6.49 $\pm$ 0.02	4.23 $\pm$ 0.02	2.01 $\pm$ 0.02	
168	J044303.08+252018.6	GO Tau	9.02 $\pm$ 0.02	8.57 $\pm$ 0.02	6.58 $\pm$ 0.02	4.43 $\pm$ 0.03	
169	J044315.85+235358.2	None	13.15 $\pm$ 0.03	11.73 $\pm$ 0.03	9.12 $\pm$ 0.03	6.66 $\pm$ 0.06	Still a candidate YSO ^b
170	J044320.22+294005.8	CIDA-14	9.11 $\pm$ 0.02	8.65 $\pm$ 0.02	6.86 $\pm$ 0.02	5.64 $\pm$ 0.04	
171	J044427.14+251216.2	IRAS 04414+2506	10.06 $\pm$ 0.03	9.36 $\pm$ 0.02	6.73 $\pm$ 0.02	4.34 $\pm$ 0.03	
172	J044653.05+170000.1	DQTau	7.07 $\pm$ 0.03	6.45 $\pm$ 0.02	4.31 $\pm$ 0.02	2.28 $\pm$ 0.02	
173	J044659.01+170238.4	Haro6-37	6.35 $\pm$ 0.04	5.69 $\pm$ 0.03	4.11 $\pm$ 0.02	2.45 $\pm$ 0.02	
174	J044748.59+292511.0	DSTau	7.39 $\pm$ 0.03	6.84 $\pm$ 0.02	5.18 $\pm$ 0.02	3.68 $\pm$ 0.02	
175	J044832.35+234746.9	None	13.01 $\pm$ 0.03	11.72 $\pm$ 0.02	8.69 $\pm$ 0.03	6.32 $\pm$ 0.05	Still a candidate YSO ^b
176	J045147.36+304713.1	UYAur	6.13 $\pm$ 0.04	4.92 $\pm$ 0.03	2.46 $\pm$ 0.02	0.38 $\pm$ 0.01	
177	J045206.67+304717.2	IRAS 04489+3042	8.84 $\pm$ 0.03	7.56 $\pm$ 0.02	5.09 $\pm$ 0.02	2.52 $\pm$ 0.02	
178	J045209.70+303745.2	Haro6-39	9.95 $\pm$ 0.02	8.88 $\pm$ 0.02	6.18 $\pm$ 0.02	3.55 $\pm$ 0.02	
179	J045423.67+170953.3	St34	9.59 $\pm$ 0.02	9.40 $\pm$ 0.02	7.67 $\pm$ 0.02	5.42 $\pm$ 0.04	
180	J045510.97+302159.2	GMAur	8.38 $\pm$ 0.02	8.23 $\pm$ 0.02	6.06 $\pm$ 0.02	2.52 $\pm$ 0.02	
181	J045545.34+301938.6	2MJ04554535+3019389	10.16 $\pm$ 0.02	9.65 $\pm$ 0.02	8.10 $\pm$ 0.03	6.51 $\pm$ 0.11	
182	J045556.06+303620.7	J04555605+3036209	8.93 $\pm$ 0.02	8.43 $\pm$ 0.02	6.04 $\pm$ 0.02	3.79 $\pm$ 0.03	
183	J045559.39+303401.4	SUAur	5.07 $\pm$ 0.05	4.12 $\pm$ 0.04	2.54 $\pm$ 0.02	-0.09 $\pm$ 0.01	
184	J045601.18+302634.5	J04560118+3026348	9.49 $\pm$ 0.02	9.00 $\pm$ 0.02	7.21 $\pm$ 0.02	5.91 $\pm$ 0.05	

Table 1
(Continued)

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
185	J045846.27+295036.9	None	4.90 $\pm$ 0.06	3.60 $\pm$ 0.04	1.54 $\pm$ 0.01	0.09 $\pm$ 0.01	
186	J045851.41+283123.8	BS τ	8.60 $\pm$ 0.02	8.08 $\pm$ 0.02	6.03 $\pm$ 0.02	3.93 $\pm$ 0.03	Known YSO but not traditional Taurus member
187	J045903.04+300300.1	HBHA3214-06	8.91 $\pm$ 0.03	8.57 $\pm$ 0.02	7.13 $\pm$ 0.02	5.14 $\pm$ 0.03	Known YSO but not traditional Taurus member
188	J050003.10+300107.4	GZAur	7.70 $\pm$ 0.02	7.00 $\pm$ 0.02	5.14 $\pm$ 0.02	3.36 $\pm$ 0.02	Known YSO but not traditional Taurus member
189	J050306.59+252319.5	V836 τ	8.14 $\pm$ 0.03	7.65 $\pm$ 0.02	5.89 $\pm$ 0.02	3.89 $\pm$ 0.02	
190	J050441.39+250954.4	CIDA-8	9.28 $\pm$ 0.02	8.84 $\pm$ 0.02	7.25 $\pm$ 0.02	5.20 $\pm$ 0.03	
191	J050509.00+252208.0	IRAS 05020+2518	5.29 $\pm$ 0.06	5.11 $\pm$ 0.03	3.65 $\pm$ 0.02	2.52 $\pm$ 0.02	Known YSO but not traditional Taurus member
192	J050522.82+253130.8	CIDA-9	9.20 $\pm$ 0.03	8.31 $\pm$ 0.02	6.01 $\pm$ 0.02	4.18 $\pm$ 0.03	
193	J050623.33+243219.8	CIDA-11	9.21 $\pm$ 0.02	8.81 $\pm$ 0.02	7.13 $\pm$ 0.02	5.67 $\pm$ 0.04	
194	J050746.97+312018.4	HOAur	7.59 $\pm$ 0.02	7.22 $\pm$ 0.02	5.99 $\pm$ 0.02	4.11 $\pm$ 0.02	Known YSO but not traditional Taurus member
195	J050749.55+302404.9	RWAur	6.20 $\pm$ 0.04	5.21 $\pm$ 0.03	3.35 $\pm$ 0.02	1.48 $\pm$ 0.02	
196	J050754.96+250015.4	CIDA-12	10.16 $\pm$ 0.02	9.79 $\pm$ 0.02	7.85 $\pm$ 0.02	5.98 $\pm$ 0.05	

Notes.

^a See the full table description in Section 3.3.

^b Object identified in Rebull et al. (2010) as a candidate Taurus member, but discussed there as needing additional data to confirm/refute it as a Taurus member.

(This table is also available in a machine-readable form in the online journal.)

Figure 3. Location on the sky of the recovered previously identified YSOs (+), the rejected objects ($\times$), and the best remaining candidates (circles). The previously identified YSOs are generally highly clustered, and the newly identified candidates are less clustered.

(A color version of this figure is available in the online journal.)

POSS, and if possible, SDSS. We then identified objects as likely subject to source contamination, resolved as a likely galaxy, or still apparently clean, relatively isolated point sources.

We have thus identified 686 objects that are confirmed or likely galaxies, 13 foreground or background stars, 1 PN, and 24 objects that seem to be subject to confusion in the relatively large *WISE* beam (and therefore any excess seen in the SED is likely to be contaminated by the confused source). There are 94 objects still surviving in the potential YSO candidate list. The rejected objects appear in Table 2, and the 94 surviving objects appear in Table 3. SEDs for the 94 potential YSO objects appear in the Appendix.

4. OVERALL PROPERTIES

We now attempt to assess the overall contamination as well as identify very high-likelihood YSOs out of our candidate list using the ancillary data we have amassed.

4.1. Projected Location

Figure 3 shows the location on the sky of the recovered previously identified YSOs, the rejected objects, and the surviving candidate YSOs. The previously identified YSOs are generally highly clustered along the filamentary distribution of gas and dust, and the new objects are less clustered. This is as expected, since many searches have focused on the regions already known to contain young stars, and our goal was to look for new YSOs outside the canonical groupings of previously known Taurus members. However, this could also be an indication of persistent contamination in the surviving list of YSO candidates.

Figure 4 is a more quantitative view of the clustering seen in Figure 3, showing a distribution of separations. Previously identified YSOs are very close, on average, to another previously identified YSO. The contaminants have a much broader

Figure 4. Histogram (top two; middle is zoomed-in version of the top) and cumulative distribution (bottom; fraction of sample with number of points less than the corresponding x value) of distances in arcminutes to the nearest previously identified YSO for recovered known YSOs (green, solid line; distance is to the nearest other YSO), rejected contaminants (red, dotted line), and new YSO candidates (black, dashed line).

(A color version of this figure is available in the online journal.)

distribution and are further from the known YSOs on average. The distribution of candidate YSOs is closer to that of the contaminants than the previously identified YSOs.

In the context of proximity of objects to other known objects, as noted above, some of our objects can be found within the tidal radius of the Pleiades ($\sim 6^\circ$; Adams et al. 2001). Objects identified here that are within $\sim 6^\circ$ of the Pleiades could belong to the Pleiades rather than Taurus. One recovered known YSO is within this radius (IRAS 04016+26102), 104 rejected contaminants, and 12 YSO candidates (J035323.82+271838.3, J035519.09+233501.8, J035535.05+291319.3, J040204.41+251210.3, J040612.75+264308.0, J040636.44+251019.1, J040644.43+254018.1, J040651.36+254128.3 = V1195 Tau, J040716.73+240257.6, J040809.49+222434.8, J041141.34+261341.3, and J041240.69+243815.6).

4.2. Reddening

Figure 5 is another look at this same issue of contamination in the candidate list, this time through the lens of A_V . The previously known YSOs are generally found in regions of high A_V , and background galaxies are found in regions of low A_V . As discussed above, we obtained a coarse estimate of A_V based on a $\sim 6' \times 6'$ box centered on the position of the object in a map constructed from 2MASS star counts (Froebrich et al. 2007). Figure 5 shows that the distribution of A_V for the candidates is considerably closer to the distribution of A_V for the contaminants rather than the previously known YSOs. The largest A_V found for the recovered YSOs is 10.8 mag, and the largest A_V for

Table 2
Multiband Measurements of *WISE*-identified Rejected YSO Candidates in Taurus Region

Line Num.	Catalog Number	Name	W1 ($3.4\ \mu\text{m}$) (mag)	W2 ($4.6\ \mu\text{m}$) (mag)	W3 ($12\ \mu\text{m}$) (mag)	W4 ($22\ \mu\text{m}$) (mag)	Notes
1	J035135.81+260914.3	2MASX03513585+2609139	13.82 ± 0.03	12.94 ± 0.03	9.67 ± 0.05	7.47 ± 0.13	Galaxy: extended in 2MASS, SED shape
2	J035228.38+252002.4	None	12.14 ± 0.03	10.94 ± 0.02	8.36 ± 0.03	6.34 ± 0.06	Galaxy: SED shape
3	J035234.58+252729.5	None	13.37 ± 0.03	12.28 ± 0.02	9.19 ± 0.04	6.54 ± 0.07	Galaxy: SED shape
4	J035300.20+274013.1	None	13.89 ± 0.03	12.88 ± 0.03	9.99 ± 0.06	7.81 ± 0.16	Galaxy: SED shape
5	J035300.52+290542.9	None	12.05 ± 0.02	11.78 ± 0.03	8.40 ± 0.03	7.03 ± 0.08	Galaxy: SED shape
6	J035309.58+272953.5	2MASX03530961+2729541	12.27 ± 0.03	11.11 ± 0.02	8.36 ± 0.03	6.23 ± 0.05	Galaxy: extended in 2MASS, SED shape
7	J035322.85+281358.1	None	14.77 ± 0.04	13.13 ± 0.03	9.69 ± 0.05	6.96 ± 0.08	Galaxy: SED shape
8	J035334.67+270854.1	None	12.78 ± 0.03	11.67 ± 0.02	9.02 ± 0.03	6.63 ± 0.06	Galaxy: SED shape
9	J035334.93+253651.3	None	11.92 ± 0.03	10.95 ± 0.02	8.18 ± 0.03	6.02 ± 0.04	Galaxy: SED shape
10	J035348.05+291411.3	None	13.52 ± 0.03	12.38 ± 0.03	9.61 ± 0.04	7.24 ± 0.10	Galaxy: SED shape

(This table is available in its entirety in a machine-readable form in the online journal. A portion is shown here for guidance regarding its form and content.)

Table 3
Multiband Measurements of *WISE*-identified New YSO Candidates in Taurus Region

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
1	J035323.82+271838.3	None	11.29 $\pm$ 0.03	10.58 $\pm$ 0.02	8.66 $\pm$ 0.03	6.75 $\pm$ 0.08	Within Pleiades tidal radius (Section 4.1)
2	J035412.25+312034.0	None	12.10 $\pm$ 0.03	11.76 $\pm$ 0.02	9.69 $\pm$ 0.05	7.64 $\pm$ 0.14	
3	J035454.27+295944.0	None	8.04 $\pm$ 0.02	7.34 $\pm$ 0.02	5.31 $\pm$ 0.02	4.05 $\pm$ 0.02	
4	J035519.09+233501.8	None	13.60 $\pm$ 0.03	12.79 $\pm$ 0.03	9.55 $\pm$ 0.05	6.76 $\pm$ 0.07	Within Pleiades tidal radius (Section 4.1)
5	J035535.05+291319.3	None	13.86 $\pm$ 0.03	13.06 $\pm$ 0.03	10.19 $\pm$ 0.06	7.43 $\pm$ 0.13	Within Pleiades tidal radius (Section 4.1)
6	J035919.63+310730.1	None	13.56 $\pm$ 0.03	12.39 $\pm$ 0.03	9.08 $\pm$ 0.03	6.90 $\pm$ 0.08	Excess just at 22 (Section 4.6)
7	J035935.02+315409.6	2MASX03593501+3154090	13.55 $\pm$ 0.03	13.12 $\pm$ 0.03	8.40 $\pm$ 0.03	4.91 $\pm$ 0.03	
8	J035958.81+312901.1	HD281395	8.95 $\pm$ 0.02	8.95 $\pm$ 0.02	8.69 $\pm$ 0.03	6.25 $\pm$ 0.05	
9	J040056.13+314301.3	None	7.63 $\pm$ 0.03	7.14 $\pm$ 0.02	5.30 $\pm$ 0.02	2.05 $\pm$ 0.02	Excess just at 22 (Section 4.6)
10	J040159.15+321941.2	HD281479	9.09 $\pm$ 0.02	9.09 $\pm$ 0.02	8.24 $\pm$ 0.02	6.20 $\pm$ 0.05	
11	J040204.41+251210.3	None	13.78 $\pm$ 0.03	13.04 $\pm$ 0.03	10.20 $\pm$ 0.07	7.54 $\pm$ 0.13	
12	J040226.63+314409.0	None	11.98 $\pm$ 0.02	11.46 $\pm$ 0.02	9.45 $\pm$ 0.04	7.21 $\pm$ 0.09	Within Pleiades tidal radius (Section 4.1). Good <i>JHK</i> (Section 4.4)
13	J040259.96+315703.9	None	9.59 $\pm$ 0.03	9.33 $\pm$ 0.02	8.44 $\pm$ 0.03	5.26 $\pm$ 0.03	
14	J040403.90+320116.8	None	13.16 $\pm$ 0.03	12.63 $\pm$ 0.03	10.18 $\pm$ 0.07	7.43 $\pm$ 0.14	
15	J040407.21+315914.5	None	12.23 $\pm$ 0.03	11.99 $\pm$ 0.02	10.13 $\pm$ 0.06	7.54 $\pm$ 0.14	Within Pleiades tidal radius (Section 4.1)
16	J040559.61+295638.2	None	7.73 $\pm$ 0.03	7.16 $\pm$ 0.02	5.22 $\pm$ 0.02	1.93 $\pm$ 0.02	
17	J040612.75+264308.0	None	14.31 $\pm$ 0.03	13.10 $\pm$ 0.03	9.39 $\pm$ 0.04	6.66 $\pm$ 0.07	
18	J040636.44+251019.1	None	14.48 $\pm$ 0.04	13.12 $\pm$ 0.03	9.34 $\pm$ 0.04	6.34 $\pm$ 0.06	Within Pleiades tidal radius (Section 4.1)
19	J040644.43+254018.1	None	11.42 $\pm$ 0.03	11.03 $\pm$ 0.02	9.25 $\pm$ 0.04	7.49 $\pm$ 0.14	Within Pleiades tidal radius (Section 4.1)
20	J040651.36+254128.3	V1195Tau	7.53 $\pm$ 0.03	7.33 $\pm$ 0.02	6.07 $\pm$ 0.02	4.56 $\pm$ 0.02	Within Pleiades tidal radius (Section 4.1). Excess just at 22 (Section 4.6)
21	J040716.73+240257.6	None	12.96 $\pm$ 0.03	11.77 $\pm$ 0.02	9.18 $\pm$ 0.04	6.91 $\pm$ 0.09	Within Pleiades tidal radius (Section 4.1)
22	J040805.16+300627.6	None	13.51 $\pm$ 0.03	12.42 $\pm$ 0.03	9.69 $\pm$ 0.05	7.34 $\pm$ 0.12	Good <i>JHK</i> (Section 4.4)
23	J040809.49+222434.8	None	13.63 $\pm$ 0.03	12.11 $\pm$ 0.03	9.23 $\pm$ 0.04	7.24 $\pm$ 0.12	Within Pleiades tidal radius (Section 4.1)
24	J040913.79+313632.5	None	12.15 $\pm$ 0.02	11.74 $\pm$ 0.02	10.02 $\pm$ 0.06	7.54 $\pm$ 0.14	Excess just at 22 (Section 4.6)
25	J041025.61+315150.7	HD281664	9.88 $\pm$ 0.03	9.86 $\pm$ 0.03	9.29 $\pm$ 0.04	7.11 $\pm$ 0.09	
26	J041130.69+295628.3	None	12.93 $\pm$ 0.03	11.46 $\pm$ 0.02	8.47 $\pm$ 0.03	6.05 $\pm$ 0.05	
27	J041141.34+261341.3	None	13.61 $\pm$ 0.03	12.36 $\pm$ 0.03	9.69 $\pm$ 0.05	7.34 $\pm$ 0.12	Within Pleiades tidal radius (Section 4.1). Iffy <i>r, z</i> (Section 4.5)
28	J041240.69+243815.6	None	9.64 $\pm$ 0.02	9.24 $\pm$ 0.02	6.87 $\pm$ 0.02	4.59 $\pm$ 0.03	Within Pleiades tidal radius (Section 4.1). Good <i>r, z</i> (Section 4.5)
29	J041320.01+311047.1	HD281789	6.93 $\pm$ 0.03	6.38 $\pm$ 0.02	2.99 $\pm$ 0.02	0.61 $\pm$ 0.02	Good <i>JHK</i> (Section 4.4) (SDSS spectrum: STAR -M5) good <i>r, z</i> (Section 4.5)
30	J041419.20+220138.0	None	13.15 $\pm$ 0.03	12.22 $\pm$ 0.03	9.14 $\pm$ 0.04	6.72 $\pm$ 0.07	
31	J041551.98+315514.0	None	12.93 $\pm$ 0.03	12.55 $\pm$ 0.03	10.28 $\pm$ 0.08	7.24 $\pm$ 0.10	
32	J041734.21+360814.8	None	12.31 $\pm$ 0.03	11.97 $\pm$ 0.03	8.45 $\pm$ 0.03	5.55 $\pm$ 0.04	Excess just at 22 (Section 4.6)
33	J041752.27+360720.2	None	11.46 $\pm$ 0.03	11.45 $\pm$ 0.03	9.83 $\pm$ 0.05	7.67 $\pm$ 0.15	
34	J041831.61+352732.7	None	11.82 $\pm$ 0.02	9.47 $\pm$ 0.02	6.72 $\pm$ 0.02	3.79 $\pm$ 0.02	
35	J041946.18+194539.8	HD284346	8.70 $\pm$ 0.02	8.72 $\pm$ 0.02	8.49 $\pm$ 0.03	5.84 $\pm$ 0.04	Excess just at 22 (Section 4.6)
36	J042118.39+364820.5	None	14.13 $\pm$ 0.04	12.65 $\pm$ 0.03	8.86 $\pm$ 0.03	6.24 $\pm$ 0.06	$A_V > 2$ (Section 4.2) Ify <i>r, z</i> (Section 4.5)
37	J042146.44+240147.1	None	14.52 $\pm$ 0.04	13.16 $\pm$ 0.04	9.68 $\pm$ 0.05	6.92 $\pm$ 0.09	
38	J042213.75+152529.9	None	6.94 $\pm$ 0.03	6.39 $\pm$ 0.02	4.99 $\pm$ 0.02	1.93 $\pm$ 0.01	
39	J042220.80+170812.0	None	14.05 $\pm$ 0.03	12.61 $\pm$ 0.03	9.13 $\pm$ 0.03	7.06 $\pm$ 0.09	Ify <i>r, z</i> (Section 4.5)
40	J042224.69+333459.3	None	11.43 $\pm$ 0.02	11.45 $\pm$ 0.02	8.84 $\pm$ 0.03	7.16 $\pm$ 0.10	
41	J042350.39+164035.1	None	14.37 $\pm$ 0.04	13.04 $\pm$ 0.04	9.46 $\pm$ 0.04	6.88 $\pm$ 0.08	
42	J042541.31+353718.8	None	8.87 $\pm$ 0.03	8.38 $\pm$ 0.02	7.27 $\pm$ 0.02	3.81 $\pm$ 0.03	
43	J042604.39+342435.7	None	10.77 $\pm$ 0.02	10.35 $\pm$ 0.02	8.92 $\pm$ 0.03	6.49 $\pm$ 0.06	

Table 3
(Continued)

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
44	J042623.36+213508.1	None	13.77 $\pm$ 0.03	13.02 $\pm$ 0.05	10.03 $\pm$ 0.09	6.65 $\pm$ 0.11	
45	J042625.87+351507.6	None	10.44 $\pm$ 0.03	9.56 $\pm$ 0.02	7.36 $\pm$ 0.02	5.53 $\pm$ 0.04	Good r, z (Section 4.5)
46	J042659.19+183548.7	None	12.98 $\pm$ 0.03	11.81 $\pm$ 0.02	8.57 $\pm$ 0.03	5.77 $\pm$ 0.04	Iffy r, z (Section 4.5)
47	J042818.51+303605.3	None	14.40 $\pm$ 0.04	13.62 $\pm$ 0.05	9.20 $\pm$ 0.04	7.10 $\pm$ 0.10	
48	J042850.54+184436.1	None	9.79 $\pm$ 0.03	9.42 $\pm$ 0.03	7.19 $\pm$ 0.02	5.09 $\pm$ 0.04	$A_V > 2$ (Section 4.2)
49	J042923.42+245314.8	None	11.94 $\pm$ 0.03	11.68 $\pm$ 0.03	9.22 $\pm$ 0.04	6.97 $\pm$ 0.08	
50	J042954.77+291228.5	None	10.61 $\pm$ 0.02	10.56 $\pm$ 0.02	9.66 $\pm$ 0.05	6.74 $\pm$ 0.08	Excess just at 22 (Section 4.6)
51	J043118.56+324237.8	None	13.81 $\pm$ 0.03	13.03 $\pm$ 0.04	9.92 $\pm$ 0.06	7.43 $\pm$ 0.13	
52	J043131.61+293819.0	None	13.73 $\pm$ 0.03	12.96 $\pm$ 0.03	9.96 $\pm$ 0.06	7.17 $\pm$ 0.09	
53	J043229.33+281434.9	None	13.91 $\pm$ 0.03	13.01 $\pm$ 0.04	9.50 $\pm$ 0.04	6.74 $\pm$ 0.08	
54	J043326.74+204758.7	None	12.76 $\pm$ 0.03	11.56 $\pm$ 0.03	9.06 $\pm$ 0.04	6.91 $\pm$ 0.08	Iffy r, z (Section 4.5)
55	J043327.90+175843.8	None	10.05 $\pm$ 0.02	8.88 $\pm$ 0.02	6.53 $\pm$ 0.02	4.07 $\pm$ 0.03	Good JHK (Section 4.4)
56	J043616.13+322119.4	None	11.64 $\pm$ 0.02	11.51 $\pm$ 0.02	9.71 $\pm$ 0.05	6.15 $\pm$ 0.05	
57	J043714.47+323011.7	None	14.28 $\pm$ 0.04	13.63 $\pm$ 0.05	9.10 $\pm$ 0.03	6.05 $\pm$ 0.05	
58	J043720.50+203024.4	None	11.69 $\pm$ 0.03	11.64 $\pm$ 0.02	9.45 $\pm$ 0.04	6.95 $\pm$ 0.08	
59	J043741.83+282112.6	None	14.26 $\pm$ 0.03	13.20 $\pm$ 0.03	9.37 $\pm$ 0.04	6.54 $\pm$ 0.06	
60	J043837.06+183934.2	None	14.05 $\pm$ 0.03	12.91 $\pm$ 0.03	9.73 $\pm$ 0.05	6.53 $\pm$ 0.06	
61	J043845.02+173743.1	None	10.30 $\pm$ 0.02	9.88 $\pm$ 0.02	8.07 $\pm$ 0.02	6.02 $\pm$ 0.05	
62	J043847.26+173725.9	None	11.39 $\pm$ 0.02	10.90 $\pm$ 0.02	9.04 $\pm$ 0.03	7.05 $\pm$ 0.09	
63	J044118.60+311544.2	None	12.27 $\pm$ 0.03	11.41 $\pm$ 0.03	8.55 $\pm$ 0.03	6.75 $\pm$ 0.08	
64	J044257.69+312822.6	None	12.67 $\pm$ 0.03	11.39 $\pm$ 0.02	8.18 $\pm$ 0.02	5.98 $\pm$ 0.05	
65	J044305.62+291737.6	None	13.66 $\pm$ 0.03	13.18 $\pm$ 0.03	10.98 $\pm$ 0.12	7.38 $\pm$ 0.12	
66	J044428.98+201537.5	None	13.16 $\pm$ 0.03	12.62 $\pm$ 0.03	7.96 $\pm$ 0.02	4.89 $\pm$ 0.03	Iffy r, z (Section 4.5)
67	J044512.68+194501.1	None	13.54 $\pm$ 0.03	12.51 $\pm$ 0.03	9.30 $\pm$ 0.04	6.94 $\pm$ 0.08	Good JHK (Section 4.4)
68	J044717.49+193149.1	None	14.11 $\pm$ 0.03	12.99 $\pm$ 0.03	9.65 $\pm$ 0.05	6.80 $\pm$ 0.07	
69	J044719.33+325449.8	None	13.58 $\pm$ 0.03	12.35 $\pm$ 0.03	9.33 $\pm$ 0.04	6.72 $\pm$ 0.07	Good JHK (Section 4.4)
70	J044746.77+305635.8	2MASX04474674+3056355	11.53 $\pm$ 0.03	11.06 $\pm$ 0.03	9.22 $\pm$ 0.04	7.06 $\pm$ 0.10	
71	J044801.88+294902.1	2MASX04480189+2949023	13.49 $\pm$ 0.03	12.69 $\pm$ 0.03	9.62 $\pm$ 0.05	7.13 $\pm$ 0.10	Good JHK (Section 4.4)
72	J044813.48+292453.5	None	8.44 $\pm$ 0.02	7.74 $\pm$ 0.02	5.33 $\pm$ 0.02	3.53 $\pm$ 0.02	Good JHK (Section 4.4)
73	J044837.31+304145.1	None	12.29 $\pm$ 0.03	12.28 $\pm$ 0.03	10.07 $\pm$ 0.06	7.16 $\pm$ 0.09	
74	J045122.95+300206.8	None	11.98 $\pm$ 0.02	11.78 $\pm$ 0.02	9.03 $\pm$ 0.03	6.91 $\pm$ 0.09	
75	J045141.49+305519.5	2MASX04514147+3055196	12.36 $\pm$ 0.02	11.73 $\pm$ 0.02	7.90 $\pm$ 0.02	5.20 $\pm$ 0.04	$A_V > 2$ (Section 4.2)
76	J045141.56+292918.9	None	14.58 $\pm$ 0.04	13.23 $\pm$ 0.04	9.60 $\pm$ 0.05	6.82 $\pm$ 0.08	
77	J045352.77+222813.7	None	12.07 $\pm$ 0.03	10.97 $\pm$ 0.02	8.07 $\pm$ 0.03	5.67 $\pm$ 0.04	Good JHK (Section 4.4)
78	J045400.09+254219.2	None	13.96 $\pm$ 0.03	13.22 $\pm$ 0.03	9.94 $\pm$ 0.06	7.04 $\pm$ 0.09	
79	J045522.17+250923.2	None	13.43 $\pm$ 0.03	12.25 $\pm$ 0.03	9.02 $\pm$ 0.03	6.45 $\pm$ 0.06	Iffy r, z (Section 4.5)
80	J045737.44+232513.9	None	10.99 $\pm$ 0.02	10.98 $\pm$ 0.02	8.71 $\pm$ 0.03	5.89 $\pm$ 0.04	
81	J045808.02+251852.6	None	10.54 $\pm$ 0.02	10.59 $\pm$ 0.02	9.88 $\pm$ 0.06	7.40 $\pm$ 0.12	Good r, z (Section 4.5). Excess just at 22 (Section 4.6)
82	J045913.28+320201.3	None	11.99 $\pm$ 0.02	10.83 $\pm$ 0.02	8.03 $\pm$ 0.02	5.47 $\pm$ 0.04	Good JHK (Section 4.4)

Table 3
(Continued)

Line Num.	Catalog Number	Name	W1 (3.4 μ m) (mag)	W2 (4.6 μ m) (mag)	W3 (12 μ m) (mag)	W4 (22 μ m) (mag)	Notes
83	J045943.63+252647.2	None	14.58 $\pm$ 0.04	12.99 $\pm$ 0.03	9.36 $\pm$ 0.04	6.93 $\pm$ 0.09	Iffy r, z (Section 4.5)
84	J050213.63+301014.2	None	13.63 $\pm$ 0.03	12.38 $\pm$ 0.03	9.47 $\pm$ 0.04	7.19 $\pm$ 0.10	
85	J050234.82+274549.6	None	10.77 $\pm$ 0.02	10.36 $\pm$ 0.02	7.57 $\pm$ 0.02	5.37 $\pm$ 0.04	
86	J050239.85+245933.5	None	10.31 $\pm$ 0.03	9.76 $\pm$ 0.02	7.38 $\pm$ 0.02	6.13 $\pm$ 0.05	
87	J050357.98+265828.8	HD284075	9.27 $\pm$ 0.02	9.27 $\pm$ 0.02	8.87 $\pm$ 0.03	6.09 $\pm$ 0.05	Excess just at 22 (Section 4.6)
88	J050450.13+264314.6	HD32509	6.92 $\pm$ 0.03	6.94 $\pm$ 0.02	5.81 $\pm$ 0.02	3.35 $\pm$ 0.02	Excess just at 22 (Section 4.6)
89	J050547.69+243058.9	None	11.66 $\pm$ 0.03	11.53 $\pm$ 0.02	8.74 $\pm$ 0.03	7.35 $\pm$ 0.11	
90	J050726.91+211716.5	None	13.36 $\pm$ 0.03	12.60 $\pm$ 0.03	9.43 $\pm$ 0.04	6.98 $\pm$ 0.09	
91	J050731.86+205428.2	None	12.06 $\pm$ 0.02	12.07 $\pm$ 0.02	10.32 $\pm$ 0.07	7.74 $\pm$ 0.15	
92	J050739.03+231106.5	None	11.00 $\pm$ 0.03	10.64 $\pm$ 0.02	9.16 $\pm$ 0.04	7.48 $\pm$ 0.13	
93	J050836.48+270614.7	None	11.89 $\pm$ 0.03	11.41 $\pm$ 0.02	9.16 $\pm$ 0.04	7.31 $\pm$ 0.12	
94	J050841.75+311521.9	None	11.08 $\pm$ 0.02	10.59 $\pm$ 0.02	9.00 $\pm$ 0.03	7.41 $\pm$ 0.12	

(This table is also available in a machine-readable form in the online journal.)

Figure 5. Histogram of A_V values (top two; middle is zoomed-in version of the top), and cumulative distribution of A_V values (bottom), for recovered known YSOs (green, solid line), rejected contaminants (red, dotted line), and new YSO candidates (black, dashed line). The distribution of A_V values for the candidates is much closer to the distribution of contaminants than previously known YSOs. The A_V estimates come from a median $\sim 6' \times 6'$ box centered on the position of the object.

(A color version of this figure is available in the online journal.)

the candidates is only 3 mag (J042850.54+184436.1), with two others having $A_V > 2$ (J042213.75+152529.9– $A_V = 2.6$, J045141.49+305519.5– $A_V = 2.7$). These may be among the highest likelihood YSOs on our candidate list. This analysis could indicate that our list of surviving candidate YSOs is substantially contaminated, or it could reflect instead the fact that all the searches to date (including our prior *Spitzer* survey) have focused on regions of high A_V , and the “discovery space” is in the regions of lower A_V .

Figure 6 shows the distribution of recovered YSOs, new YSO candidates, and rejected YSO candidates on the A_V map from Froebrich et al. (2007). As inferred above, the rejected objects tend to be evenly distributed, and the recovered YSOs tend to be clustered in regions of high A_V . The new objects are not particularly clustered, but not evenly distributed either. There is an apparent clump of objects in the northwest, toward Perseus (see also Figure 2); most of these objects have excesses only at $22\ \mu\text{m}$, which, as discussed below, may be a result of source confusion.

4.3. W1 Brightnesses

The color cuts in Koenig et al. (2011) are performed in, among other color spaces, W1 versus W1–W4 ([3.4] versus [3.4]–[22]). This diagram, and its *Spitzer* analog ([3.6] versus [3.6]–[24]), has proven to be very useful in identifying YSO candidates (see, e.g., Rebull et al. 2010). Figure 7 shows this diagram for the 94 YSO candidates, rejected candidates, and

recovered YSOs. Photospheres (stars without disks) would have a W1–W4 color near zero, and galaxies near W1 ~ 16 , W1–W4 ~ 7 , but they have already been removed by the Koenig et al. (2011) process. Most of the previously identified YSOs are bright, and most of the contaminants are faint. The new YSO candidates span the range of bright and faint.

The distribution of brightnesses at W1 ($3.4\ \mu\text{m}$) can be seen explicitly in Figure 8. Figure 8 suggests a different conclusion than Figure 5; here, the new candidates are intermediate in cumulative brightness distribution between the previously known YSOs (brighter) and the contaminants (fainter). This assessment is reinforced by the formal values calculated for two-sided two-dimensional Kolmogorov–Smirnov tests. This is consistent with broad expectations; most of the background galaxies will be faint, most of the surveys to date will have found the bright YSOs, and the “discovery space” for new YSOs is on the faint end of the distribution of expected brightnesses for YSOs in Taurus. Unextincted YSOs in Taurus above the hydrogen burning limit should be no fainter than 13th magnitude at W1. Thus, fainter YSOs should show evidence of extinction, and much fainter ones could only be edge-on disks or more distant emission-line objects.

Figure 8 suggests that our YSO list is contaminated to a larger degree at the faint end of the distribution of $3.4\ \mu\text{m}$ magnitudes. There is a small peak in the distribution of candidate magnitudes at the same location of the highest peak of contaminant magnitudes (W1 ~ 13.5 mag), suggesting that the highest fraction of contaminants per bin will be found in those bins. Similar results are obtained for, e.g., a histogram of H magnitudes. However, it is worth noting that in our earlier studies of Taurus, we found a large number of bright background stars (e.g., AGBs) that appeared to have excesses, but are not members of Taurus.

4.4. Near-IR Colors

Figure 9 shows the JHK_s color–color diagram for the 94 YSO candidates, rejected candidates, and recovered known YSOs. Consistent with expectations and with Figure 5 above, the distribution of the previously identified YSOs extends from the locus of normal young and accreting stars with near-infrared excesses in the direction of the reddening vector. Encouragingly, the distribution of contaminants is broad and generally consistent with non-stellar sources. Few of the YSO candidates have large values of A_V , consistent with Figure 5. There are 11 objects with $(H - K_s) > 0.75$ and $(J - H) > 1$: J040204.41+251210.3, J040805.16+300627.6, J041419.20+220138.0, J043131.61+293819.0, J043327.90+175843.8, J044512.68+194501.1, J044719.33+325449.8, J044801.88+294902.1, J044813.48+292453.5, J045352.77+222813.7, and J045913.28+320201.3. These objects are in the right regime of the JHK_s diagram to be higher-quality YSO candidates. However, as can be seen in the Appendix, we have no ancillary photometric data for most of these, and for the two where we do have such data, the *WISE* measurements do not agree with those from *Akari* (J044813.48+292453.5) or IRAC (J043131.61+293819.0 = 0431316+293818 in our *Spitzer* catalog). This is not generally the case—usually the *WISE*, *Akari*, and *Spitzer* measurements are in good agreement. One reason they might not agree would be the differing resolution of the instruments—if there is source confusion or the source is resolved (e.g., it is a likely galaxy), then the photometry would not agree. However, these objects are point sources in all of the images we examined. Another reason why the photometry might be different is that the young stars themselves may vary between

Figure 6. Locations of YSO candidates and recovered previously identified YSOs (left, purple and green, respectively) and rejected candidates (right) superimposed on an A_V map constructed from 2MASS by Froebrich et al. (2007) with $\sim 4'$ resolution. The structure seen in the A_V can be compared to that seen in *IRAS* 100 μm in Figure 2.

Figure 7. $W1$ vs. $W1-W4$ ($[3.4]$ vs. $[3.4]-[22]$) color-magnitude diagram for the recovered previously identified YSOs (+), the rejected candidates ($\times$), and the best remaining YSO candidates (circles).

epochs (see, e.g., Morales-Calderon et al. 2011, or Rebull 2011, and references therein). Additional observations are warranted.

4.5. Optical Data

The SDSS data do not extend over our entire studied region, but optical data can be very helpful in ruling out YSO candidates. There are matches to SDSS spectra for only 27 objects in our entire set, 15 of which are tagged galaxies (including known YSOs CoKu Tau/1 and GV Tau; presumably the SDSS pipeline

Figure 8. Histogram of $W1$ ($3.4 \mu\text{m}$ values; top two, where middle is zoomed-in version of the top), and cumulative distribution of $W1$ values (bottom), for recovered known YSOs (green, solid line), rejected contaminants (red, dotted line), and new YSO candidates (black, dashed line). Unlike the A_V distributions in the previous figure, here the distribution of values for the candidates much more similar to that for the previously known YSOs than that for the contaminants.

is confused by emission lines in these sources). Eleven more of the SDSS spectra are for previously identified YSOs. Thirteen of the objects that we have placed in our “reject” list have SDSS

Figure 9. JHK_s color-color diagram for the recovered previously identified YSOs (+), the rejected candidates ($\times$), and the best remaining YSO candidates (circles).

(A color version of this figure is available in the online journal.)

Figure 10. SDSS r vs. $(r-z)$ in AB magnitudes for the recovered previously identified YSOs (+), the rejected candidates ($\times$), and the best remaining YSO candidates (circles). The main sequence from Bochanski et al. (2010) is the solid line. Legitimate Taurus objects could be below the main sequence as a result of edge on disks; in those cases, we are seeing scattered light from substantial infrared excesses viewed at a high inclination angle.

(A color version of this figure is available in the online journal.)

spectra, all of which are galaxies. Just one of our surviving YSO candidates has an SDSS spectrum, and it is identified as an M5. Since our placement of objects on the reject or candidate YSO list was independent of the SDSS spectra, this is encouraging and suggests that our classification of the remaining objects without SDSS spectra may be correct on average.

There are SDSS z measurements for $\sim 26\%$ of our entire set, but only $\sim 15\%$ of our surviving YSO candidate list. Figure 10 shows the r versus $(r-z)$ color-magnitude diagram for our

Figure 11. $W1-W4$ ($[3.4]-[22]$) vs. K_s-W3 ($K_s-[12]$) for the recovered previously identified YSOs (+), the rejected candidates ($\times$), and the best remaining candidates (circles).

(A color version of this figure is available in the online journal.)

objects. Most of the recovered known YSOs are in the expected location, e.g., to the red side in the diagram. Just four of our candidate YSOs are in the main portion of the distribution of known YSOs (J041240.69+243815.6, J041551.98+315514.0, J042625.87+351507.6, and J045808.02+251852.6). It is worth noting that the distribution of previously identified YSOs as well as candidates extends into the regime occupied by the contaminants on the blue side, but that all five of the previously identified YSOs in that area ($r < 1.9$ and $(r-z) < 1.9$) are actually unconfirmed YSOs from Rebull et al. (2010) (J041604.83+261800.9, J041810.60+284447.0, J041823.20+251928.0, J041858.99+255740.0, and J041940.48+270100.7), and may in the end turn out not to be Taurus members. The nine new YSO candidates in that regime may have a similar fate; they are J041141.34+261341.3, J041831.61+352732.7, J042146.44+240147.1, J042220.80+170812.0, J042659.19+183548.7, J043326.74+204758.7, J044428.98+201537.5, J045522.17+250923.2, and J045943.63+252647.2.

4.6. Size of Infrared Excess

Since the *WISE* spatial resolution is relatively low, especially if there is an infrared excess seen only at $22\ \mu\text{m}$, one must be suspicious of source confusion. The long wavelength excess objects may also be the most interesting astrophysically, since they could have large inner disk holes. We have investigated each of the images and have not been able to identify source confusion. Objects that we have identified that have excesses only at $22\ \mu\text{m}$ can be selected out of Figure 11. Objects with small K_s-W3 excesses (< 2) generally also have small $W1-W4$ excesses, but the eleven that also have $W1-W4 < 4$ are the ones for which we are most suspicious of source confusion: J035958.81+312901.1, J040159.15+321941.2, J040651.36+254128.3, J041025.61+315150.7, J041752.27+360720.2, J041946.18+194539.8, J042954.77+291228.5, J045808.02+251852.6, J050357.98+265828.8, and J050450.13+264314.6.

Table 4
Comparison of Gutermuth et al. (2008, 2009) and Koenig et al. (2011) Methods

Koenig et al. Classification	Gutermuth et al. Contaminant	Gutermuth et al. Class 0/I	Gutermuth et al. Class II
Class I	2	65	19
Class II	5	17	84
Transition disk	12	2	4

Table 5
Breakdown of the Koenig et al. (2011) Classifications

Sample	Class I	Class II	Transition Disk
Of the rejects (number)	365	211	148
Of the rejects (fraction)	0.50	0.29	0.20
Of the recovered (number)	62	122	12
Of the recovered (fraction)	0.32	0.62	0.06
Of the candidates (number)	28	46	20
Of the candidates (fraction)	0.29	0.49	0.21

4.7. Distribution of SED Classifications

In Rebull et al. (2010), we compared a variety of YSO selection methods, and we also had enough ancillary data that we were able to categorize most of the objects that *WISE* sees in this overlap region; Figure 3 shows relatively few *WISE*-identified new YSO candidates in the region where we had *Spitzer* data (compare to Figure 1). In the region of *Spitzer* coverage, we can compare the selection statistics for the Koenig et al. (2011) method with that from Gutermuth et al. (2008, 2009). There are IRAC-1 measurements for $\sim 25\%$ of our set. There are 210 for which we can calculate a Gutermuth et al. classification, 119 of which are recovered known YSOs. Both the Koenig et al. and Gutermuth et al. methods return SED classifications of objects. Table 4 shows a comparison of the methods. For the most part, the classifications agree—Gutermuth et al. identify relatively few of the sources as contaminants (9%), and both methods agree that 31% of the sample are Class I and 40% are Class II.

Finally, we consider, among the objects we have recovered, rejected, or retained as YSO candidates, the distribution of classifications returned by the Koenig et al. (2011) method; see Table 5. The rejected sources are predominantly categorized as Class I candidates, consistent with the observation that many have very flat SEDs suggestive of extragalactic objects (or a reflection of our selection bias against very flat SEDs). The recovered YSOs are mostly categorized as Class II, consistent with what is already known in Taurus. The set of surviving YSO candidates is also mostly categorized as Class II objects.

5. CONCLUSIONS

We have presented the results of our search for new candidate Taurus members using 2MASS+*WISE* data over ~ 260 deg². We used NIR+MIR colors to select a set of YSO candidates following methodology presented by Koenig et al. (2011). We compared the resultant list of YSO candidates to our own catalog from Rebull et al. (2010), updated to include Taurus members not in our original *Spitzer* map, the 2MASS Extended Source Catalog, several SDSS stripes (photometry plus spectroscopy), and *Akari* data. We recover 196 previously identified young stars in the direction of Taurus with infrared excess and identify 686 objects that are confirmed or likely galaxies, 13 foreground or background stars, 1 PN, 24 objects likely subject to confusion based on inspection of the images, and 94 new YSO

candidates. As was the case for our smaller *Spitzer*-based search for YSO candidates (Rebull et al. 2010), supporting ancillary data and manual inspection of the images and SEDs for each YSO candidate are critical. The YSO candidates are broadly distributed in (projected) space, unlike the previously identified YSOs, which are generally clustered. Few are in regions of high A_V (again, unlike the recovered YSO sample), but they are generally fainter in $3.4\ \mu\text{m}$ than the previously identified sample. There is likely to be contamination lingering in this list. We identify a few objects that are particularly likely to be legitimate YSOs, and a few that are particularly likely to be contaminants. Follow-up spectra to obtain spectral types and to search for emission lines and other indications of youth are warranted.

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APPENDIX

SEDs FOR ALL OF THE CANDIDATES

For each of our new candidate Taurus members, we provide an SED here in Figure 12. Notation is as follows: “+”—literature Johnson photometry, “*”—Sloan photometry, “x”—CFHT photometry, diamonds—2MASS, circles—IRAC, stars—*WISE*, triangles—*Akari*, and squares—MIPS. Limits for any band, if available, are indicated by arrows. The wavelength is in

Figure 12. SEDs for the new candidate members, shown here for J041551.98+315514. Notation is as follows: “+”—literature Johnson photometry, “*”—Sloan photometry, “x”—CFHT photometry, diamonds—2MASS, circles—IRAC, stars—WISE, triangles—*Akari*, squares—MIPS. Limits for any band, if available, are indicated by arrows. The wavelength is in microns; λF_{λ} is in cgs units ($\text{erg s}^{-1} \text{cm}^{-2}$). Each plot has the WISE catalog number, which can also be found in Table 3.

(The complete figure set (94 images) is available in the online journal.)

microns; λF_{λ} is in cgs units ($\text{erg s}^{-1} \text{cm}^{-2}$). Each plot has the WISE catalog number, which can also be found in Table 3.

Note added in proof: E. Mamajek, via private communication, notes that Tycho-2 and UCAC3 proper motions for several of the objects do not seem to have a proper motion consistent with the Taurus subgroups. The motions of HD 281395, 281479, 281664, 281789, 284346, and 284075 are all very small—they are probably background objects. HD 32509 is a previously known Ae star with IR excess—it seems to be an isolated young massive star with a disk, but its proper motion (pmRA, pmDec

$= +15, -32 \text{ mas yr}^{-1}$) isn’t similar to that of the group that it is nearest to (L1544; pmRA, pmDec $= +0.9, -17.6 \text{ mas yr}^{-1}$; Table 8 of Luhman et al. 2009). The clump near RA, Dec $\sim 60, +31$ (HD 281395, 281479, 281664, 281789) might be members of Per OB2 association at $d \sim 300 \text{ pc}$.

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