Wide-field Infrared Survey Explorer (WISE)

WSDC Quality Assurance Procedures

Version 1.1

20-January-2010

Prepared by: J. Davy Kirkpatrick

Infrared Processing and Analysis Center
California Institute of Technology

WSDC D-C002

Approved By:

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Roc Cutri, WISE Science Data Center Manager

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Tim Conrow, WISE Science Data Center Lead Engineer

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Davy Kirkpatrick, WISE Science Data Center Lead Quality Assurance Scientist

Revision History

Date	Version	Author	Description
10 September 2009	0.1	D. Kirkpatrick	Initial Draft
27 October 2009	1.0	D. Kirkpatrick	First Version
20 January 2010	1.1	D. Kirkpatrick	Updated based on IOC and early OPS experience

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INTRODUCTION

The processing pipelines at the WISE Science Data Center (WSDC) will create data products for eventual use by the scientific community. Data integrity is judged by a series of Quality Assurance (QA) reports that track reductions through each stage of processing. Each QA subsystem collects parameters, compares them to concise metrics, and presents the results in a summary made available to the QA reviewer.

The QA scientist checks these auto-generated reports for accuracy and scrutinizes any problems found. Accuracy is gauged via standard checks performed by the QA scientists, and potential problems are analyzed using a combination of standard QA and offline tools. The QA report is modified and/or augmented by the QA reviewers to incorporate the results of these checks and analyses. Serious anomalies are reported and tracked separately.

In some cases, such as for Scan/Frame QA and for final coadds in Multiframe QA, grades are assigned. For these, sign-offs are required by other portions of the WISE project.

This document details the procedures that the WSDC QA team will follow when performing its quality checks of data through the various stages of processing. To ease interpretation of subsequent sections, Figure 1 shows these QA steps (in yellow) in relation to the rest of the processing pipeline and Final Products Generation.

Although all members of the extended QA team will be cross-trained in all aspects of QA, each step is overseen by a specific subgroup. The Core QA team (CQA) oversees Quicklook, Scan/Frame,and Multiframe QA. The WMOPS QA team (WQA) oversees WMOPS QA. The Postdoc Analysts (PD) oversee Archive QA and share responsibilties with the Instrument Characterization Scientists (ICS) for overseeing Trending QA. Ingest QA is fully automated (no oversight necessary), and tasks for Final Products QA will be distributed to the entire QA team as well as non-QA personnel at the WSDC.
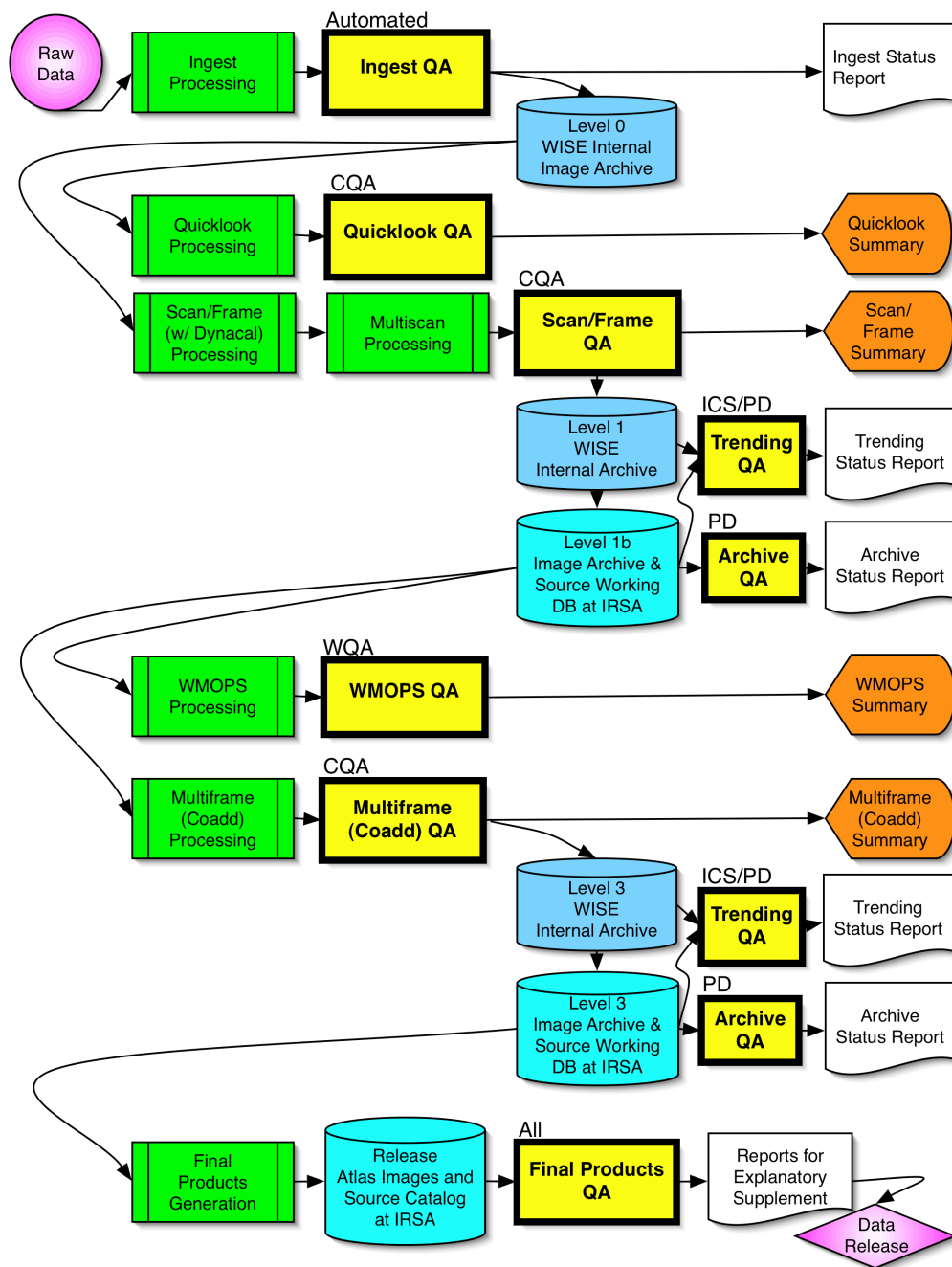
Figure 1: Data processing flow from raw data to public data release (lavender symbols). Data processing steps are shown in green, archival steps in blue, Quality Assurance steps in yellow, web QA summaries in orange, and other QA reports in white.

1 QA PROCEDURES DURING IN-ORBIT CHECKOUT

The goal of In-Orbit Checkout (IOC) is to judge the health of the spacecraft and telescope/instrument and prepare the mission for its standard data-taking phase. Most IOC data will be taken in a mode unlike that used during In-Orbit Operations, so the standard QA pipeline software may not always run successfully. These analyses will be performed using custom software and analysis tools and will be performed by the larger WISE team (WSDC QA team, WISE Science Team, SOC/MOS personnel, WSDC developers, etc.) These by-hand custom analyses are considered to be their own QA.

During IOC, the QA team will compute the actual thresholds to use during routine In-Orbit Operations. Some thresholds may not be determinable until In-Orbit Operations has begun, so these activities will extend beyond the nominal IOC period. Tasks include –

- Determining noise thresholds using SAA passages. (Ressler)
- Deriving warning thresholds for scan synch monitor. (QA Team)
- Deriving fiducial on-orbit flats. (Masci)
- Deriving fiducial on-orbit masks. (Masci)
- Verifying the stability of primary and secondary standard stars using successive pole passages. (Wheelock, QA Team)
- Determining optimal SNR thresholds for detections to meet completeness requirements. (WSDC Team)

2 QA PROCEDURES DURING FIRST-PASS OPERATIONS

The goal of first-pass processing is to produce a Preliminary Image Atlas and Preliminary Source Catalog for public release. Toward that goal, the QA team will follow a list of well defined procedures to judge data quality The subsections below give an outline and flow chart of the procedure used in each QA subsystem. The charts are coded as follows:

WISE participants:
  WSDC Ops Team = red
  WSDC QA Team = magenta
  WSDC Archive = aqua
  WMOPS Team = fern
  MOS = green
  SOC = orange
  MPC = brown
  IRSA = salmon
  WISE Sci Team = aluminum

Procedural flow:
(color indicates which participant at left performs function)
  Necessary branch = solid path
  Occasional branch = dashed path

A. Ingest QA
   a. Sign-up: None needed since process is fully automated.
   b. Timescale: Processing occurs up to 4x per day but reports sent only once daily.
   c. Report: Automated. No human (QA Team) intervention required.
   d. Audience: Reports for each ingest made available via web to MOS and SOC.
   e. Anomalies: Alerts sent and tracked via Redmine as they occur.
   f. Sign-off: None needed.
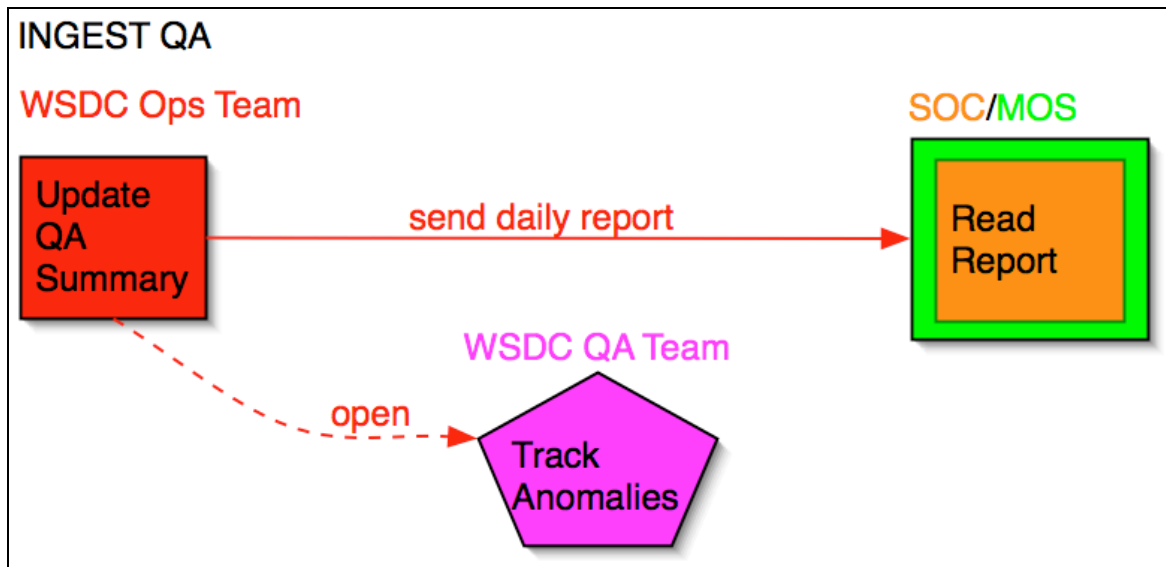
B. Quicklook QA
   a. Sign-up: Using the QA web application, reviewer selects a processing run to review.
   b. Timescale: Reports required within 24 hrs after data transfer, which occurs up to 4x per day. Daily overview report sent by WSDC Ops to MOS/SOC.
   c. Report: Daily Ops notification to SOC/MOS is meant as a quick feedback to other parts of the WISE project. Web-accessible reviews performed by QA team and based on auto-generated summaries are intended to catch and track problems or serious anomalies and need not be completed prior to Ops notification.
   d. Audience: Daily report notification sent to SOC and MOS.
   e. Anomalies: Alerts sent and tracked via Redmine.
   f. Sign-off: None needed.
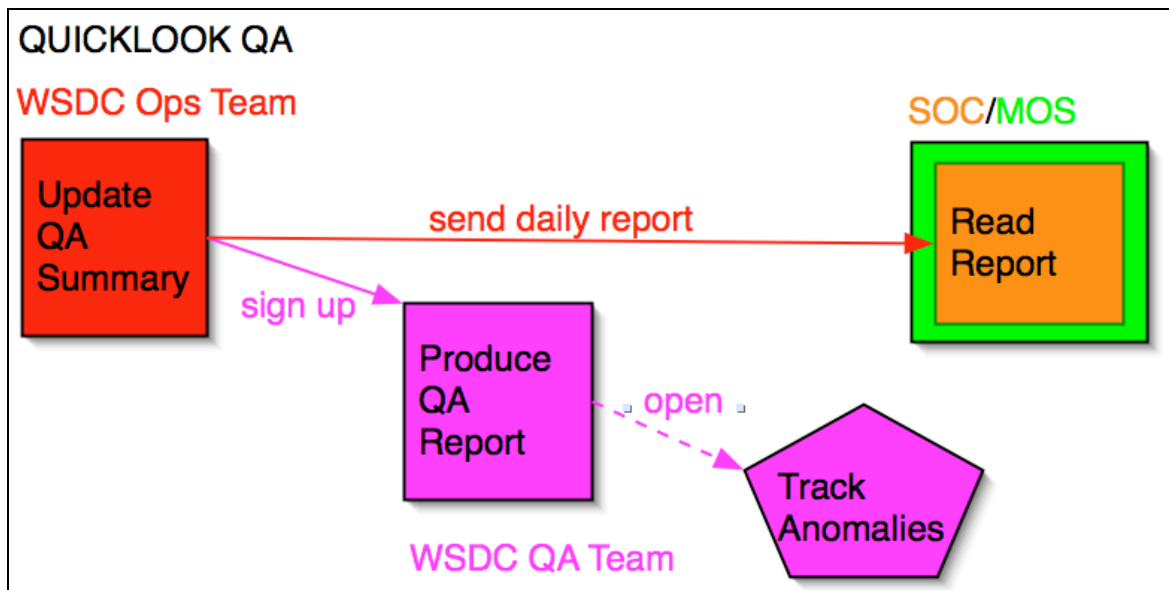
C. Scan/Frame QA
   a. Sign-up: Using the QA web application, reviewer selects a processing run to review.
   b. Report: Auto-generated report is completed/reviewed online using diagnostic information gathered by QA web application and by-hand analysis when necessary. When complete, reviewer reruns QA web app to update QA scoring.
   c. Timescale: Goal is to complete report within 6 days after data transfer to WSDC.
   d. Audience: After report is completed, web page updated to reflect "Reviewed". E-mail notification sent to SOC and MOS daily to report most recent changes to review status.
   e. Anomalies: Any anomalies are entered into and tracked via Redmine.
   f. Sign-off: PI or his designee reviews report and sends okay or rejection to WSDC via QA web app. If okayed, Archive alerted that data are ready for archive ingestion. If rejected, report modified by QA team, updated, and re-sent for additional PI review; new anomalies reported; and/or previous anomalies removed. Only the QA team has the ability to modify QA reports; only the PI or his designee has the ability to okay reports and thus give the Archive Team the green light to ingest data into IRSA.

SCAN/FRAME QA

WSDC Ops Team   WSDC QA Team   SOC/MOS   WSDC Archive

Update QA Summary — sign up → Produce QA Report

reject

send "ready"

Review Report — approve → Prepare Ingest
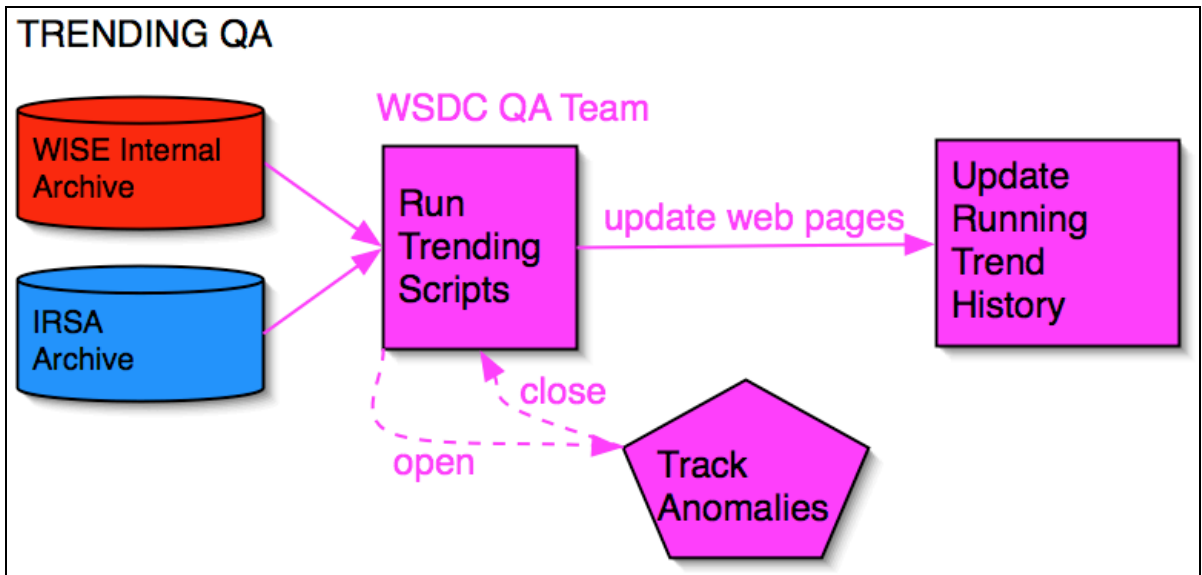
close

open

Track Anomalies

open

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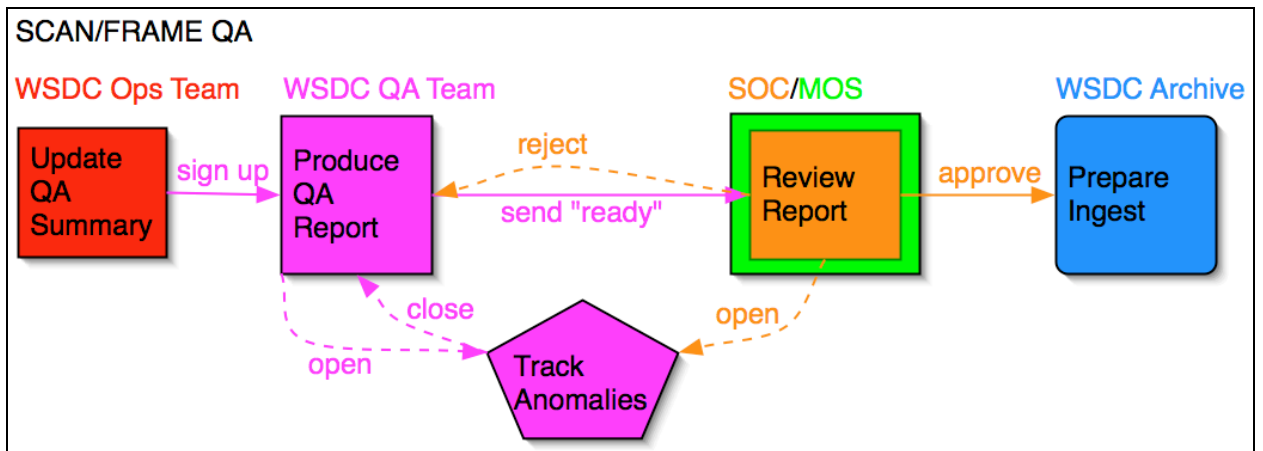
D. Moving Object QA
   a. Sign-up: Using the QA web application, reviewer selects a processing run to review.
   b. Timescale: Processing is run every two days on ~30 scans of data. After processing, report is due within 2 days to the MPC.
   c. Report: Statistical integrity checks performed on objects with sound tracklets. For objects with uncertain tracklets, scientific overview of data (including re-running of tracklet computation when needed) is performed.
   d. Audience: After report is completed, web page updated to reflect "ready for review" by the WMOPS Team. E-mail notifications sent to the WMOPS Team when these new reviews are posted.
   e. Anomalies: Any anomalies are entered into and tracked via Redmine.
   f. Sign-off: A designee from the WMOPS Team reviews report and sends okay or rejection to WSDC via QA web app. If okayed, Archive alerted that data are ready for archive ingestion and the MPC given tracklets to publicize to the astronomical community. (These public products include both the questionable tracklets okayed by the QA team as well as sound tracklets not needing special scrutiny.) If rejected, report modified by QA team, updated, and re-sent for additional WMOPS Team review; new anomalies reported; and/or previous anomalies removed. Only the QA team has the ability to modify QA reports; only a designee from the WMOPS Team has the ability to okay reports so that data flow to the Archive Team and the MPC.
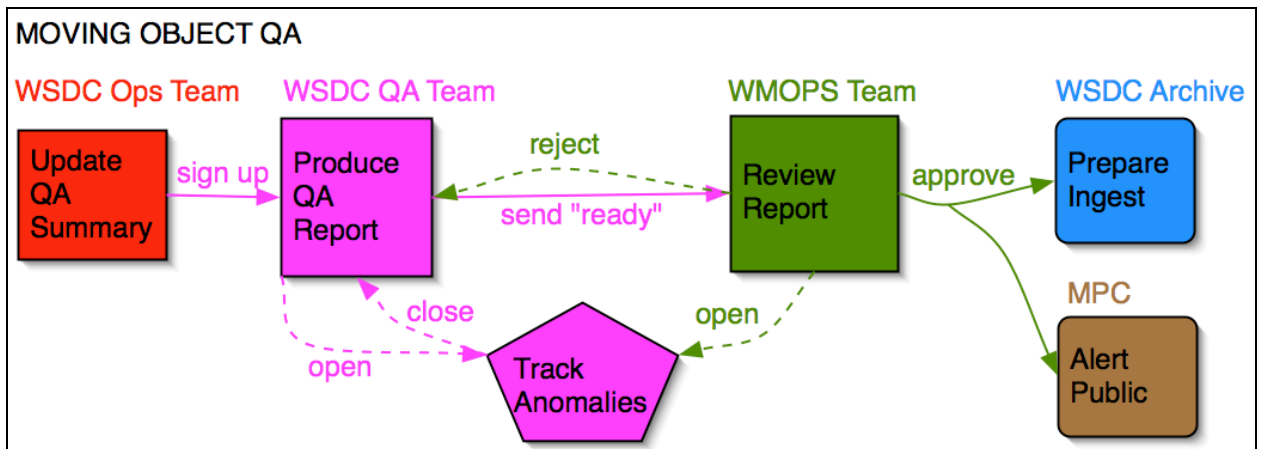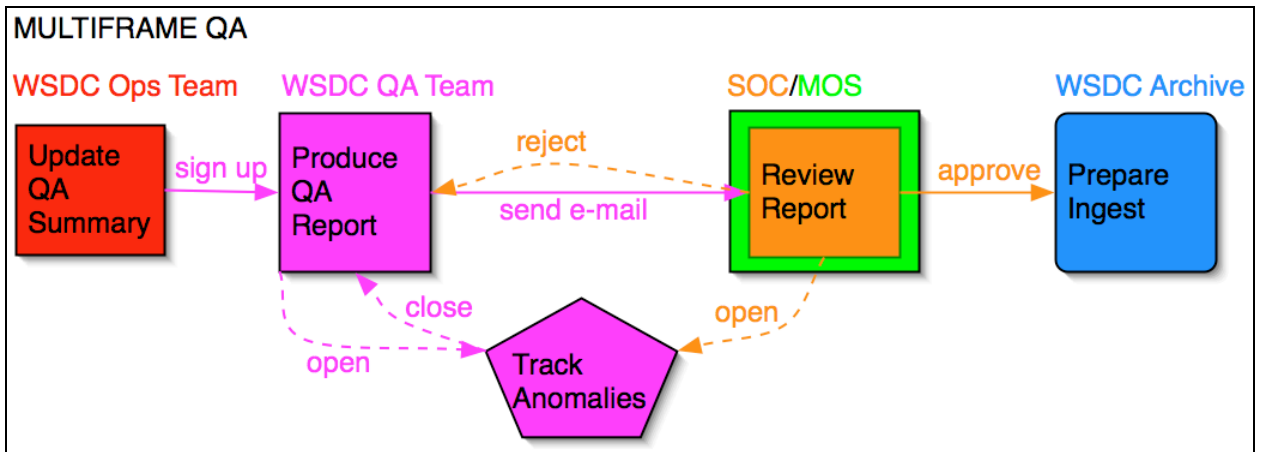
E. Trending QA
    a. Sign-up: Individual QA members have been assigned specific trending QA checks that they oversee. The detailed list of checks is described in the QA Plan.
    b. Timescale: Trending checks are initially updated once per week. Once the time variability of a particular parameter has been assessed, this update schedule will be adjusted appropriately. For example, it is the goal to update the anneal trending daily, while flat field trending will be limited by the amount of new input data needed to generate new flats (i.e. likely every two weeks).
    c. Report: Automated trending scripts will use diagnostic information gathered by the QA web application and by-hand analysis when necessary. The trending information will be collected on dedicated trending web pages.
    d. Audience: The trending web pages will indicate when they have been updated. Web pages will be reviewed once a week by the QA team lead and are also accessible to the WISE Science Team.
    e. Anomalies: Any anomalies are entered into and tracked via Redmine.
    f. Sign-off: None needed.

TRENDING QA

WSDC QA Team

WISE Internal Archive

IRSA Archive

Run Trending Scripts

update web pages

Update Running Trend History

close

open

Track Anomalies

F. Multiframe QA

a. Sign-up: TBD
b. Timescale: TBD
c. Report: TBD
d. Audience: TBD
e. Anomalies: TBD
f. Sign-off: TBD

MULTIFRAME QA

WSDC Ops Team — Update QA Summary — sign up → Produce QA Report — send e-mail ↔ reject → Review Report — approve → Prepare Ingest (WSDC Archive)

WSDC QA Team: Produce QA Report

SOC/MOS: Review Report

Track Anomalies — open / close / open

G. Archive QA

  a. Sign-up: Individual QA members have been assigned specific trending QA checks that they oversee. The detailed list of checks is described in the QA Plan.
  b. Timescale: Goal is to run archive checks twice per week in concert with each IRSA database load.
  c. Report: QA Team will produce a list of standard checks (e.g., range checking on parameters, checksums) and report any problems found via the appropriate alerting system.
  d. Audience: QA reports lacking problems are not sent out, although web page is updated that load was verified. Problems, however, are propagated to other members of the WISE team, as discussed below.
  e. Anomalies: Problems with data integrity are entered into and tracked with Redmine. Problems related to IRSA performance (GATOR, WISE Image Services) are entered into and tracked with the IRSA Help Desk.
  f. Sign-off: None needed for non-problematic reports. (Problems are handled by the alerting system described in section 5 below or by the IRSA Help Desk).
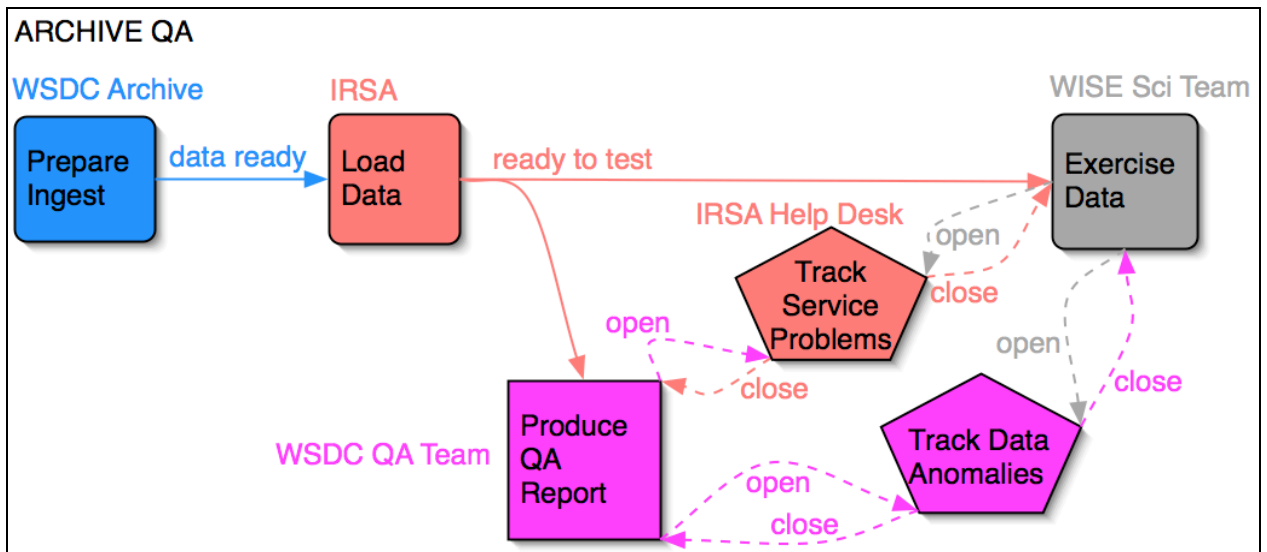
H. Final Products QA
   TBD

3 QA PROCEDURES DURING SECOND-PASS PROCESSING

TBD.

4 QA PROCEDURES FOR ANOMALY REPORTS

The WSDC uses Redmine software for recording anomalies that impact the integrity of WISE science data. The software allows for the entering, assigning, and tracking of anomalies. Once an anomaly is analyzed and the issue closed, Redmine acts as a repository of the associated analysis reports.

For some anomalies assigned to them, MOS may track the same issues using their ISA (Incident Surprise Anomaly) system. The recipient of these reports in the Mission Manager.

IRSA has their own issue tracking system, the IRSA Help Desk (via Test Track), which will be used to track problems with WISE online services.