10. GPS–GIS support to sterile release programmes

STEP V OF PROCESS IN FLOW CHART IN APPENDIX 2

Prior to the development of the current Global Positioning System — Geographical Information System (GPS–GIS) in use today, flying and releasing was done by visual means both on the ground and in the air. Personnel were stationed at various positions on the ground with flags and/or balloons to guide aircraft along flight paths and to define the release areas. This was a very inaccurate and time consuming operation that required numerous personnel in sometimes harsh environmental conditions. Pilots were required to visually fly areas utilizing landmarks that were often hard to define or lacking altogether. Maps were few and the ones that were there were normally out of date.

With the current GPS–GIS capabilities, the actual position and location of where the aircraft is required to fly can be actually recorded and verified during the flights. Data such as position of aircraft (Latitude/Longitude and/or Universal Traverse Methods), altitude flown, speed of aircraft, lane numbers of release, speed of the release machine operation, whether the release machine is operating or off is actually recorded and provided after each flight.

10.1 MAPPING OF RELEASE AREAS

When a programme area is initially defined, actual maps are normally collected and used to determine how and where a release will be done. The points that define the boundaries of the area are put into the commercially available GIS mapping system which in turn will use this data along with the lane spacing and direction of flight to map the flight lanes. If there are no maps or if the maps have changed drastically from when they were printed, these systems can still be utilized.

The system can map the boundaries and lanes with data provided or the boundaries can be flown and recorded in the flight data recorder. Then the mapping systems are used to draw the actual release areas and flight lanes.

10.2 COMMON REQUIREMENTS FOR GPS-GIS IN AERIAL RELEASES

The system needs to be able to record and display the date and time of the entire flight from takeoff to landing and differentiate between standard flight and flight when the release system is on/off. The system should provide immediate deviation indications that are sufficiently accurate to keep the aircraft on the desired flight path and also other features:

- A compact moving map display with polygon feature that will alert the pilot when the aircraft is entering or exiting a specific geographic polygon.
- Software designed for parallel offset in increments equal to the assigned swath width of the application aircraft.
- A course deviation indicator (CDI) or a course deviation light bar must be installed on the aircraft and in a location that will allow the pilot to view the

indicator with direct peripheral vision without looking down. The CDI must be capable of pilot selected adjustments for course deviation indication with the first indication at 1 meter or less.

- The system must display to the pilot the current lane number and cross-track error. The lane advance may be set manually or automatically. If automatic is selected, the pilot must be able to override the advance mode to repeat applications of single or multiple lanes.
- The system must be equipped with software for flight data logging that has a system memory capable of storing a minimum of 4 hours of continuous flight log data set at one second intervals. The full logging record will include position, time, date, altitude, ground speed, cross-track error, release on/off, insect release machine auger or motor RPM, aircraft registration number, pilot name, and job name or number.
- The flight data log software shall be compatible with DOS compatible PC computers, dot matrix/laser/inkjet printers and plotters.
- The system must compensate for the lag in logging release on/off. The system will display release on/off at the boundary without a saw tooth effect. Must be capable to end log files, rename and start a new log in flight.
- The software must generate the map of the entire flight within a reasonable time. System that require more than one minute to generate a map for a three hour flight on a PC (minimum 486 microprocessor with 16 MB of RAM) are unacceptable. When viewed on the monitor or a printed copy, the flight path will clearly differentiate between release on/off.
- The software must be capable of displaying the entire flight in slow motion and stop and restart the replay at any point during the flight. Must be able to zoom any portion of the flight for viewing in greater detail and print the entire flight or the zoomed-in portion.
- Must have a measure feature that will measure distance in meters or feet between lanes or any portion of the screen. Must be able to determine the exact latitude/longitude at any point on the monitor.
- Flight information software provided with the system must have the capability to interface with other mapping software. The interface process must be "user friendly", as programme personnel will be responsible to operate the system in order to access the information.
- A "Users Manual" must be provided with the equipment and the data logger software.
- All recorded flight information at the end of each day will be provided to the programme personnel. Information should be provided on a standard 3.5" high density diskette or if another means is used, a downloading devise to enable programme personnel the ability to retrieve information must be provided.

10.3 COMMON REQUIREMENTS FOR GPS–GIS FOR GROUND RELEASES

For ground releases, all monitoring trap site coordinates should be recorded using GPS. Releases should not occur within 100 m of a monitoring site. Release staff should be provided with paper or electronic devices to ensure the 100 m buffer is maintained. If releases are made too close to traps, high numbers of sterile males will be trapped. Large numbers of sterile flies in traps may artificially indicate a high recapture rate, suggesting the sterile fly population is higher than it really is. Large numbers of sterile flies in traps create an additional and unnecessary work load for identification services. Additionally, if a single wild fly enters the trap with hundreds of sterile flies, dye transference becomes increasingly likely, creating uncertainty and additional work for identification services. Sterile flies are expensive to produce and

distribute and should not be wasted by releases near monitoring traps. The use of GPS–GIS technology helps to avoid these problems and ensures efficient use and monitoring of the SIT operations (IAEA 2006).

10.4 REFERENCES CITED

(IAEA) International Atomic Energy Agency. 2006. Designing and implementing a geographical information system: for managers of area-wide pest management programmes. Joint FAO/IAEA Programme. Vienna, Austria.