HIS-20 Health Physics Information System

Description

HIS-20 is a complete Health Physics Information System which is designed to document compliance with the latest USNRC, USDOE, and ICRP regulations and methodologies. HIS-20 integrates all of the functions needed to provide a comprehensive Health Physics program, including the following: Personnel Management, External Dosimetry, Internal Dosimetry, Access Control, Radiation Work Permits (RWP), Survey Data, Radiological Incident Reporting, and Inventory Management and Control.

HIS-20 is written using the UNIFACE 4GL, a platform-independent software language. HIS-20 can operate in a traditional client-server environment, via the web (using the Site's intranet) or using a file server for HIS-20 client software. Because of the flexibility in platform selection, HIS-20 can support future system modifications and upgrades.

Regulatory Compliance

HIS-20 complies with methodology defined by industry standards for dosimetry and health physics record keeping including ICRP26 and ICRP30.

Software Quality Assurance

CANBERRA has a comprehensive software QA program and is a certified ISO 9001 compliant company. HIS-20 has been developed in accordance with IEEE and ANSI standards. For the HIS-20 product, the following documents have been prepared and are maintained:

- Software Quality Assurance Plan (SQAP)
- Software Requirement Specification (SRS)
- Software Design Document (SDD)
- Software Validation and Verification Plan (SVVP)
- Software Validation and Verification Report (SVVR)

Site-Specific Configuration and Customization

HIS-20 is designed to minimize or eliminate the amount of customization necessary to meet site-specific requirements. The database allows the site’s HIS-20 manager to choose functional parameters and to set up lookup tables specific to site operations.

Site-specific customization is available for modification of HIS-20. HIS-20 is designed in accordance with IEEE and ANSI software design standards, therefore, modification of HIS-20 software includes modification of support documentation and Validation and Verification of the changes.
HIS-20 Health Physics Information System

SOFTWARE OPERATION
HIS-20 software is easy to use. The menus are configured in the industry standard windows-like format. Context sensitive Help functions are available at all times. Mouse and/or keyboard activated functions are available to the user. HIS-20 also supports bar code or magnetic card data entries.

All HIS-20 Modules are available from the Main Menu bar. When a module such as Personnel is selected, all functions are displayed on the pull down menu. Selection of a specific function, such as Preactivate Employee, brings the user to that function screen.

HIS-20 uses site-specific lookup tables to enhance data entry and ensure integrity. Data can be entered by selecting a value from a drop-down list, a “pick” list or by manually entering it. All lookup table contents are defined by the user; for example, Training Types, Departments, etc.

Records may be recalled and displayed in a simple manner, by performing a retrieve on an appropriate field. For example, to view all air sample results for an individual, the user enters the unique ID and performs a retrieve recalling the most recent record. Other records may be viewed by performing a next occurrence or previous occurrence.

Many of the data entry forms include the ability to maintain data from sub-forms. For example, the forwarding address for an employee is entered from the “Employee Address” form. Leaving the sub-form brings the user back to the original screen. In addition, HIS-20 groups many like activities into tab forms. This streamlines data entry by allowing the user to skip over fields that are not relevant. It also allows the user to quickly and easily review data for a given worker, RWP, or other data structure by toggling between the tabs.

HIS-20 includes hundreds of reports as standard documents. Each module contains predefined reports. These reports allow sorting and extracting information from the database through simple screen selection procedures. Reports contain multiple data selection and sorting criteria. Nonstandard reports are also available through field retrieves, SQL, the HIS-20 search print option and various third-party report writers. HIS-20 allows any screen to be output as a report. The print feature from the HIS-20 search includes the ability to export data to an XML file or comma delimited file that can easily be imported into a spreadsheet. SQL and any third-party report writing tool may be used to generate reports, which may then be scheduled to print at user-defined time intervals using the HIS-20 event scheduler.

SOFTWARE MODULES
Personnel Data Management
The Personnel function contains information pertaining to individuals. This includes demographic data, training and qualification data, previous exposure, administrative limits, status of the individual and current dose.

HIS-20 has the ability to store dose limits for each individual worker. There are both administrative limits and maximum (regulatory) limits. Exposure limit types are defined in management setup tables. This gives the user the flexibility to establish annual (and site) limits by worker category or classification (for instance, VISITOR, MINOR, RADTECH, etc.). Administrative limits are also maintained for the fetus of a declared pregnant worker. Limits are automatically assigned to a person based upon that worker’s dose history and his/her worker category (e.g., VISITOR, MINOR, etc.). Limits assigned to a worker can be edited and stored for that worker.

HIS-20 maintains functions for calculating the dose for each individual for each type of dose value. These are used for calculation of access control dose margins, and are the sum of previous dose data, external dose and dose due to internally deposited radionuclides. Dose values include Total Effective Dose Equivalent (TEDE), Total Organ Dose Equivalent (TODE), Shallow Dose Equivalent (SDE)-skin, Eye dose equivalent (LDE), SDE-extremity, DAC hours and fraction of ALI.
HIS-20 Health Physics Information System

The system manager has the ability to define qualifications. The description, title, time frame that the qualification is valid (e.g., two months or 12 months, etc.) and the grace period are all established by the site. These qualifications include training, medical, fit tests and other site-defined requirements. An unlimited number of training types can be recorded for an individual. The software application has the ability to input training data directly or to import data from a separate training system.

External Dosimetry Management
External dosimetry data is maintained by the HIS-20 database as input to the total dose values. External dosimetry data is obtained from self-reading dosimeters (such as pocket ionization chambers and electronic dosimeters) and from indirect reading dosimeters (such as TLDs and film badges). Most facilities use a combination of the types, replacing self-reading dosimeter data when the indirect data becomes available.

Automated input of TLD results and automated interfaces to electronic dosimeter readers are supported by HIS-20. Dosimetry management functions include the following:
- Assigning, activating and managing the processed results of indirect reading dosimeters
- Multi-badge assignment and management; logic is included to choose the conservative value when multi-badge dosimetry is assigned
- Determining external dose total values from a combination of direct and indirect reading dosimeter results
- Discrepancy identification, problem identification

Internal Dosimetry
The USNRC, USDOE and ICRP provide limits for both stochastic and non-stochastic doses as well as methods and parameters for calculating those doses. Doses due to internally deposited radionuclides must be assessed and, if required, summed with those from external sources to compute total dose values. HIS-20 is designed to calculate and maintain information pertaining to internal doses, including fetal doses.

HIS-20 has the ability to calculate doses due to internally deposited radionuclides from bioassay and from breathing zone air sample (BZA) data. Automated data input and dose value calculation from bioassay, gross counting or spectroscopy systems are supported by HIS-20.

The internal dosimetry functions of HIS-20 include an optional bioassay scheduler. DAC-hours are calculated from air sample data for each access an individual makes to an area with airborne radionuclides. Upon reaching a worker-defined exposure limit for either site exposure or total exposure, the individual may be excluded from entrance to a radiation controlled area.

Radiation Work Permits (RWP)
RWPs are the primary means of defining access requirements to controlled areas. The data associated with an RWP enables the Health Physicist to track exposure in such ways as to help in ALARA planning and reporting. RWPs define the scope of work, the precautions and radiological hazards on the job. HIS-20 provides two different electronic versions of an RWP: Job Specific and/or Task Based.

The HIS-20 RWP module includes the following:
- RWP/Task generation, authorization, revision and status changes
- RWP/Task, work group and individual budgeting of dose and time
- Definition of RWP/Task requirements, including training, pre-job briefing, respirators, clothing, shielding and dosimetry
- Authorization of workers
- ALARA tracking
HIS-20 Health Physics Information System

Access Control
The HIS-20 Access Control system (Windows® Access Control System, or WACS) is a completely integrated set of components used to control personnel access to radiological control areas in a facility. These components seamlessly integrate with all of the appropriate functions within HIS-20. The customer has an almost unlimited number of configuration options allowing the system to be implemented with a minimum impact on site processes and procedures.

Perimeter and sub-perimeter access control points are supported. Access is linked to an RWP, which specifies conditions and requirements for the area being accessed. A number of parameters are checked at access points, including worker dosimetry, training, respirator qualifications, RWP briefing, dose margins, and electronic dosimeter issue. HIS-20 supports both electronic and non-electronic self-reading dosimeters, as well as manned and unmanned stations.

Inventory Control
HIS-20 maintains information concerning respirators, instruments and sources in the Inventory Control module. User-defined lists of equipment and sources are maintained, as well as testing requirements (QA, calibration, leak tests, etc.) and testing frequencies. Respirators and filter types are also linked to user-defined protection factors. User training/qualifications are checked prior to issuance of devices.

Inventory Control maintains test dates and results. Issuance records are maintained for tracking equipment possession history. Inventory items may be tracked separately or compositely in a master-component sub-component relationship. Sources are decay corrected. In addition, sources may be split and the daughter sources tracked. Leak test schedules and results are maintained in the source inventory module.
Survey Management
The Survey Data Management section in HIS-20 includes the maintenance and scheduling of radiological surveys. These analysis and sample results are stored and available for reports and online viewing replacing paper records and manual tracking. Samples can be recorded for air, contamination, radiation and effluent surveys and includes information on sampling media and analysis results, as well as personnel exposure.

The survey can be made up of various data points. These points can represent air samples, contamination surveys, dose rate results and effluent samples. Each sample contains a standard site location code, sample date/time, sample type (e.g., air sample, dose rate, and smear), the sampling instrument, the person who collected and counted the sample and a list of one or more sample measurements. Optionally, a list of RWP/Task numbers can be associated with a sample, which allows the RWP/Task functions to automatically access relevant survey data.

RIR/PCR
The Radiological Incident Report/Personnel Contamination Reporting module allows the user to document unusual incidents and events. HIS-20 supports detailed documentation of the event, personnel involved investigative data, causal information, and corrective actions.

Database Management
This function allows an authorized user to set HIS-20 parameters, including defining network printers, assigning user security, setting default site parameters, editing lookup tables, maintaining the event scheduler and using the SQL query workbench.

Security
HIS-20 provides security at the system level, operator level and database structure level. HIS-20 provides single points of edit for data and provides an audit trail of changes made to selected information. System level security depends upon the hardware and operating system chosen.

At the functional level, the HIS-20 manager creates user names and passwords for the system. The passwords are stored in an encrypted format in the database and are never visible to the application. After creating users, the manager assigns privileges to qualified personnel to access functional tasks. Many of the forms have a hierarchy of security: query only, add only, edit only, add and edit, or maintain (which allows the user to add, remove, and modify data). The system is set up to quickly authorize a user for an entire module, or, selectively determine authorizations on a form-by-form basis.
HIS-20 Health Physics Information System

Networking
The HIS-20 platform independence allows users to select from a variety of hardware and software configurations. HIS-20 supports client-server and dual host networked configurations. Interface with gamma spectroscopy, whole body counter and TLD reader systems are provided.