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TENNESSEE HEALTH STUDIES AGREEMENT

Annual Report for Year 4
January 1, 1995, to December 31, 1995

An Agreement Between the Tennessee Department of Health and
the U.S. Department of Energy

Submitted April 1996

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Oak Ridge Health Studies Agreement

Annual Project Report Grant Year 1995

The Tennessee Department of Health (TDH) has completed the fourth full year of the Oak Ridge Health Studies Agreement grant. This report summarizes the accomplishments and concerns of the State for the period January 1, 1995, to December 31, 1995. The Health Studies project overall is progressing well and target dates are being reached with very few problems. Eight major categories of work under the grant are described below. Each description provides a discussion of the progress made during this grant year, concerns, budget status, and scheduling.

Dose Reconstruction:

The focus of work during the fourth grant year was the actual work on the dose reconstruction. The final work plan for Task 5, *Plan to Perform a Systematic Document Search* was received in November 1994. Final work plans for Task 1, *Investigation of Radioiodine from Radioactive Lanthanum Processing*; Task 2, *Investigation of Mercury Releases from Lithium Enrichment*; Task 3, *Investigation of Releases of PCBs from Oak Ridge Facilities*; and Task 4, *Investigation of Releases of Radionuclides from White Oak Creek to the Clinch River*, were received in February 1995. Final work plans for Task 6, *Investigation of the Quality of Historical Uranium Effluent Monitoring at Oak Ridge Facilities*, and Task 7, *Additional Screening of Materials Not Evaluated in the Dose Reconstruction Feasibility Study*, were received in April 1995. ChemRisk's 4th Quarterly Report, for October through December 1995 is included in Attachment 1.

Several issues related to access to information and security came up in 1995. The Oak Ridge Health Agreement Steering Panel (ORHASP), the Tennessee Department of Health (TDH), and ChemRisk believed that Q-cleared personnel from ChemRisk and TDH had access to, and the need to know, all information related to doing a dose reconstruction or performing epidemiological studies; this included looking at all files to make sure that they contained what they were supposed to contain and that the information had no relevancy to dose reconstruction. ChemRisk discovered that Q-cleared personnel did not have access to privacy act documents that deal with personnel issues and attorney-client privileged information, among other things. DOE worked with TDH and ChemRisk so that Q-cleared personnel could look at DOE privacy act records to make sure that the records were what they were supposed to be and had no relevance to dose reconstruction. However, DOE's contractor, Martin-Marietta Environmental Services (MMES) did not want to allow Q-cleared personnel to see privacy act records. TDH and DOE to arrived at a mutually acceptable compromise with MMES (now Lockheed Martin).

A couple of instances occurred in which it seemed that ChemRisk or its subcontractor had released confidential information. These instances were investigated, and steps were taken to

assure DOE that the release of confidential information, or the perception of the release of confidential information, would not occur.

The ORHASP struggled with the issue of DOE review of notes from interviews from ex-employees. The ORHASP voted to exclude the following categories of interview notes from DOE review:

1. Interviews with people who have never had an AEC/ERDA/DOE security clearance.
2. Interviews regarding RaLa processing at Oak Ridge.
3. Interviews regarding use of PCBs in electrical equipment.
4. Interviews regarding environmental monitoring activities or results, for mercury, PCBs, and radionuclides, provided no connection is made to particular plant sources.
5. Interviews regarding demography and land use in or near Oak Ridge.
6. Interviews regarding the behavior of toxins in the environment or the human body.

This exclusion was discussed with DOE before the final decision was made.

Registries:

Oak Ridge Associated Universities (ORAU) contracted with the Department of Health to perform activities in each hospital related to the cancer registry and the birth defects registry. For the cancer registry, ORAU performs two tasks in each facility: (1) a casefinding study to determine whether all appropriate cancer cases for a given timeframe were selected and abstracted, and (2) a reabstraction study of a random sample of cancer cases to assess the quality of the data originally reported by the facility. For birth defects, a verification form is created for infants born in a given year (started with 1991) who were identified by at least one source within the health department as having a birth defect. ORAU staff reviews information in the hospital medical records to verify the information provided by the department.

In 1995, the following activities were accomplished.

1. Departmental information needed to perform 1992 cancer and birth defects studies was provided to ORAU in December, 1994.
2. Hospital visits by ORAU staff for 1992 studies began in March, 1995. Facility-specific reports for 1992 have been provided to the State and to each facility. A summary report for the 1992 Cancer Reporting Quality Improvement Program is expected by May 1, 1996.
3. The summary report for the 1991 Cancer Reporting Quality Improvement Program was submitted by ORAU in June, 1995. See Attachment 2.
4. The contract between the Department of Health and Oak Ridge Associated Universities was amended in late September, 1995 to increase the amount by \$63,050.50. This was due to the State's underestimating the number of cancer missed cases that would be reabstracted and underestimating the number of

birth defects cases to be verified. Additionally, the contractor experienced more cost in processing travel claims than they anticipated.

5. The electronic file of information to use in updating birth defects records for infants born in 1991 was submitted by ORAU in late November, 1995. This information will be used to finalize the 1991 birth defects file. Some records will drop out of the registry if the information provided by the department is not verified by ORAU staff after the review of the hospital medical record.
6. In December, 1995, a subcontract was negotiated with Susan Ball, ART, CTR to conduct statewide training for reporting cancer information. This training includes detailed instructions for reporting cancer case information and for deciding which cases are reportable. Up to nine training sessions are planned through June 30, 1996.

Public Communications and Education:

After the communications contract with Woodward-Clyde Consultant was terminated in the fall of 1994, a new request for proposal was issued in February 1995. Five proposals were received, evaluated, and four proposers made presentations in March 1995. After evaluation by the Department of Finance and Administration, it has been determined, in accordance with Section II.G. of the request for proposal, that it was in the best interest of the State to cancel this request for proposal. Because of the uncertainties of future funding, it was decided not to pursue a communications contract.

Feasibility of Epidemiologic Studies:

At the February 1995 ORHASP meeting, Dr. Puru Thapa presented information on the health effects of exposure to mercury and PCBs. Dr. Thapa said that there were no easily definable clinical syndromes for health effects associated with lower levels of exposure to mercury or PCBs.

Dr. Thapa has presented the ORHASP with a draft plan and a revised draft plan of the report for the feasibility of epidemiologic studies.

ORHASP Meetings:

During this grant year the State and ORHASP held five business meetings, four community meetings, and one meeting with the community and three environmental health physicians. The following summarizes the major agenda items of the business and community meetings held during the year.

On February 16 - 17, 1995, the ORHASP met in Oak Ridge, Tennessee; Dr. Puru reported on the health effects associated with exposures to PCBs and mercury, Dr. Joseph Lyon reported on

the assessments of leukemia and thyroid disease in relation to fallout in Utah, and Dr. Bob Peelle presented revisions to the draft quality assurance plan. ChemRisk presented the final work plans for Tasks 1, 2, 3, and 4 and draft work plans for Tasks 6 and 7.

A community meeting was held on February 16, 1995, at the Oak Ridge Mall Community Room. The public heard a presentation by Dr. Joseph Lyon of the University of Utah on the assessments of leukemia and thyroid disease in relation to fallout in Utah.

On April 26 - 27, 1995, the ORHASP met in Oak Ridge, Tennessee; Dr. Donna Cragle presented the results of the first year of activity on the cancer quality improvement program and Dr. Puru presented the first draft report on the feasibility of epidemiologic studies. ChemRisk gave an update on Tasks 1, 2, 3, and 4 and an update on the final plans for Tasks 6 and 7.

A community meeting was held on April 26, 1995, at the City of Oak Ridge Community Center. Mr. Tom Widner of ChemRisk reported on ChemRisk's information gathering activities, followed by a question and answer period.

On June 27 - 29, 1995, the ORHASP met in Oak Ridge, Tennessee. On June 27, the panel met with members from the community and three environmental health physicians - Dr. Louis Pepper from Boston University, Dr. Howard Frumkin from Emory University, and Dr. Beth Bowen from Morehouse University. The purpose of the meeting was to discuss the community's desire for "clinical assessment." The decision for the next step was to find out the health concerns of the community around ORR. Dr. Puru, again, gave a presentation on the feasibility of epidemiologic studies, and Dr. Bob Peelle lead a discussion on long-range planning for the Oak Ridge studies. ChemRisk presented an evaluation of the screening methods used in Phase 1.

On June 28, 1995, a community meeting was held at the City of Oak Ridge Community Center. Mr. Paul Voillequé led a discussion on decision criteria. From discussion at the meeting, the ORHASP decided to rewrite the decision criteria document and present it to the public again.

The ORHASP met in Oak Ridge, Tennessee, on September 7 and 8, 1995. The ORHASP discussed comments on the feasibility of epidemiologic studies and discussed the decision criteria. ChemRisk presented information about the use of PCBs at ORR, the transfer of iodine from air to milk, screening methods, and gave updates on Tasks 2, 4, and 5.

The last ORHASP meeting of 1995 was held in Oak Ridge, Tennessee, on November 15 - 17. The ORHASP discussed the review of interview notes by DOE and had a discussion to clarify some issues about the decision criteria. Mary Layne Van Cleave reported on the Department of Health's community diagnosis plan. The DOE Oversight Office, Tennessee Department of Environment and Conservation, gave an update on their activities dealing with the cleanup of ORR. ChemRisk gave a presentation on the initial RaLa source term and exposure analysis, led a discussion about the evaluation of screening in the Phase 1 report, and gave updates on Tasks 4, 5, and 6.

A community meeting was held at the Oak Valley Baptist Church on November 16, 1995. The purpose of the meeting was to discuss the three projects to determine community health concerns that are being led by Methodist Hospital in Oak Ridge, the Tennessee Department of Health (community diagnosis plan), and the Reverend Thomas of the Scarboro Community.

During the grant year several changes occurred in the membership of the ORHASP. Dr. Eugene Fowinkle resigned from the ORHASP; Mr. Paul Voillequé was made chairman in place of Dr. Fowinkle. Dr. Paul Erwin, the director of the East Tennessee Regional Office of the Health Department replaced Dr. Fowinkle on the panel. Dr. Nasser Zawia, a neurotoxicologist from Meharry Medical School replaced Dr. Owen Hoffman; Dr. Hoffman resigned before the Request for Proposal for Phase 2 was sent out because he is a subcontractor to ChemRisk. Ms. Mary Layne Van Cleave left as Director of the Division of Environmental Epidemiology to become the Director of the Division of Assessment and Planning. Ms. Bonnie Bashor took Ms. Van Cleave's place.

It is anticipated that the ORHASP will continue to meet four or five times during the next grant year. The ORHASP is considering various options to public meetings for keeping the community informed; public meetings are not usually well attended.

Staff and Administration:

During this grant year several staffing changes occurred. Ms. Mary Layne Van Cleave, the Project Director, left to become the Director of Assessment and Planning, TDH, and Ms. Bonnie Bashor was appointed as the new Project Director. Ms. Bashor has worked on the project since 1991 as an epidemiologist. Mr. Patrick Lipford joined the project in March 1995; he works out of the East Tennessee Regional Office of the Health Department. He has a Bachelor's degree in Political Science and a Master's degree in Geography; he has extensive experience in marketing and public relations.

The Bureau of Health Services, TDH under had several reorganizations during 1995. First, the Division of Environmental Epidemiology was merged with other environmental functions in TDH, all under Dr. Wendelyn Inman. The further refinements were made and all the communicable disease and epidemiological functions were combined into the Division of Environmental and Disease Services under Dr. William Moore. Dr. Moore also serves as the State Epidemiologist. Environmental Epidemiology is now called the Section of Environmental Health Studies and Services, led by Ms. Bonnie Bashor.

Financial:

Grant year four expenditures are described in Attachment 3. Travel costs are those incurred for staff. Travel incurred by contractors and panel members are reflected in the cost center where contractor charges are presented. During this period, travel expenses were incurred by one staff member who attended at meeting on mercury toxicity at the Agency for Toxic Substances and Disease Registry in Atlanta.

A three-year budget (from January 1995 through December 1997) was submitted to Dr. Heather Stockwell of the U.S. DOE. This budget anticipated a budget shortfall of \$2.4 million. The increase in the total budget from \$12.4M to \$14.8 was not approved; however, the request to extend the project to December 31, 1997, was approved. If the entire \$12.4 million is obligated to TDH, then there should be just enough money to finish the dose reconstruction. This means that we cannot have a communications contract or any other supplementary programs.

Expenses for 1995 were within the approved budget, but were approximately \$845,000 over what was obligated. This is clearly a problem that we have worked with DOE to solve and to prevent from happening again. TDH and TDEC now agree on what has been spent. Monthly reports will detail what has been spent and what expenses have been accrued for the life of the project, for the grant year, and for the month in question. See Attachment for a copy of a letter to Donna Methot.

ATTACHMENT 1

February 13, 1996

Ms. Bonnie Bashor
Tennessee Department of Health
Environmental Health Studies & Services
Cordell Hull Building
Nashville, TN 37247-4913

Dear Bonnie:

**SUBJECT: OAK RIDGE DOSE RECONSTRUCTION PROJECT
FOURTH QUARTER 1995 PROGRESS REPORT**

We are pleased to provide to you this summary of activities undertaken by the Oak Ridge Dose Reconstruction project team during the fourth calendar quarter of 1995. Progress by the project team on each task is outlined below.

Task 1- Investigation of Radiiodine Emissions from Radioactive Lanthanum Processing

In early October, Task 1 investigators traveled to Richland, Washington to search for records concerning the irradiation of fuel slugs that were shipped from Hanford to Oak Ridge for RaLa processing. Few records were located- more visits will be required.

The first estimates of historical iodine-131 emissions from RaLa processing were presented at the November ORHASP meeting. These estimates were based on:

- ORIGEN calculations of I-131 content of fuel slugs used in runs during 1947,
- documented numbers of slugs processed during other years,
- a reported average I-131 content of Hanford slugs,
- a delay time of 5 days between discharge and dissolution of Hanford slugs, and
- an I-131 release fraction ranging from 0.5 to 10% for 1945 and 1954 and 0.5 to 5% for other years, based on informal expert elicitation and review of records.

More detailed calculations were initiated that explicitly estimate the inventory of slugs used in years other than 1947 and reflect the actual power history of the Clinton Pile rather than accumulated power values. An uncertainty analysis of the initial source term iteration was initiated. To refine the estimation of quantities released, mathematical modeling of the performance of the RaLa process caustic scrubber was initiated.

The strategy for the first iteration of the Task 1 dose and risk assessment was also presented at the November ORHASP meeting. Initial dose and risk estimates will be based on a representative child 4 km distant in the most prevalent wind direction. From estimated annual quantities released, annual-average air concentrations will be calculated with a Gaussian plume model. Airborne radioiodine will be assigned to three chemical forms, with large uncertainties on the fraction of each present.

ORHASP member comments were received on the draft technical memorandum "Screening Calculations to Estimate the Transfer Factor for Iodine-131 from Air to Pasture to the Milk of Cows and Goats." Responses to the comments were prepared by the project team, and a revised technical memorandum was issued.

Task 2- Investigation of Mercury Releases from Lithium Enrichment

Task 2 investigators responded to Panel comments on their first progress report, which was presented verbally at the September ORHASP meeting and discussed at the November meeting. The project team continued to set up the framework for uncertainty analysis in the calculation of doses and risks to off-site populations from mercury releases, in coordination with other Tasks, and continued the analysis of the quality and uncertainty of officially-reported (Mercury Task Force) estimates of mercury releases to the air and water from the Y-12 plant.

Task 2 investigators worked with Dr. Christopher Wren (Ecological Services for Planning Ltd., Guelph, Ontario) to evaluate the uptake of mercury by fish from water and sediment. Correlations between mercury concentrations in fish and mercury concentrations in water or sediment in contaminated North American aquatic ecosystems are being analyzed. As with vegetation, the ratio between levels in fish and levels in water or sediment appears to decrease as water or sediment concentrations increase. Air dispersion modeling of 1955-1962 mercury releases from the Y-12 Plant was performed to estimate concentrations in the air near on-site trees sampled by Dr. Ralph Turner. Preliminary indications are that the relationship between air and tree-ring concentrations is not linear over wide ranges of air concentrations.

The Task 2 team worked with representatives of Tasks 1, 3, and 4 to establish a common strategy for first iteration dose and health risk assessments within the Dose Reconstruction. The basic strategy includes a step of conservative screening to identify pathways of primary concern, and a second step centered on estimation of doses to approximately 5 reference individuals for each remaining pathway to reflect the likely ranges of doses and risks due to variability among individuals and uncertainty in the associated calculations.

Task 3- Investigation Releases of PCBs from Oak Ridge Facilities

The Task 3 project team documented their conceptual site model for PCBs near Oak Ridge, and presented an executive summary of the model at the November ORHASP meeting. The purposes of the conceptual site model are to describe the uses of PCBs at the Oak Ridge facilities and to describe the processes by which local populations were potentially exposed to PCBs. Newly identified documents are being reviewed and summarized as the project continues.

The project team turned their attention to collecting and organizing data for estimation of doses and health risks for the exposure pathways identified during site characterization. This activity includes development of exposure point concentrations for environmental media based on available PCB monitoring data and selection of exposure parameters for use in the initial screening. A procedure for use in performing the initial iteration of dose and risk assessment was drafted.

ChemRisk initiated a consulting agreement with HydroQual, Inc. of Mahwah, NJ, to enable analysis of data from a study performed on behalf of Martin Marietta and Union Carbide by HydroQual. In an attempt to quantitatively evaluate the relative contributions of sources of PCBs, HydroQual developed a transport model for PCBs in the Tennessee and Clinch Rivers. Their analysis suggests that only a small fraction of the PCBs entering the Watts Bar reservoir originated from the DOE plants, and that, with the exception of three periods of elevated discharges, PCB releases to the Clinch River from all sources were relatively constant over time.

HydroQual's assistance to the project will include provision of: 1) a description of their earlier project and its individual tasks; 2) a description of the mathematical model(s) used to characterize PCB and sediment transport; 3) a copy of all sampling and analysis results for PCBs performed in conjunction with the modeling effort, even if not used in the final model; 4) a description of the results and conclusions; 5) a description of the strengths and limitations of the modeling effort; 6) guidance on additional efforts that could be performed to confirm the conclusions of the analysis; and 7) guidance on additional work that could be performed to confirm historical trends in the releases of PCBs. Steps in the work with HydroQual will include a meeting at HydroQual's offices, conference calls, transmittal of available documents, and presentation of a discussion of methods and findings of the above-referenced project to ORHASP in Oak Ridge.

Task 4- Investigation of Releases of Radionuclides from White Oak Creek

At the November ORHASP meeting, Task 4 investigators presented a draft report that includes:

- A summary of the early history of the X-10 Site,
- A summary of the history of radioactive waste disposal at the site,
- A description of historical liquid radioactive effluent monitoring practices,

- Preliminary upper and lower bound estimates of the activity of radionuclides released past White Oak Dam, and
- Identification of key areas for further investigation regarding releases from White Oak Creek.

Efforts continued to document the details of historical effluent sampling, analysis, and reporting in order to support independent evaluation of the magnitude and uncertainty of historical releases from White Oak Creek.

The Task 4 team continued to refine the preliminary dose and risk calculations that are based on the initial source term estimates. These calculations continued to address historical exposures via water, sediment, and bioconcentration pathways, with environmental concentrations based on calculations using the MICHIV (MICHigan RIVer) model. The MICHIV model, which is available from the USEPA and represents the convective transport of dissolved and particulate contaminant as a function of distance from the source, is being applied and compared with the results of other aquatic transport models. As part of this effort, MICHIV was benchmarked against HEC6 modeling of the Clinch River recently performed by ORNL investigators.

Comments from Panel members concerning the initial Task 4 report were received from TDH, and the project team prepared a document containing the text of the comments and responses to each point.

Task 5- Systematic Document Search

In October, the Task 5 team responded to ORHASP comments on the revised Task 5 Plan and the Task 5 Surveillance Activity Report. An Incident/Accident spreadsheet was converted to an Access database. A total of 107 document summary forms (DSFs) were entered into the project database, an audit of October InMagic files was conducted, and a quarterly update of the InMagic database was sent to TDH. The majority of Young Moon's time was spent at the DOE Records Center reviewing boxes and developing the strategy for eliminating boxes as non-relevant. Mr. Moon reviewed 13 boxes that had been sent from the Atlanta FRC to Oak Ridge due to Privacy Act concerns- five additional boxes were requested and five boxes are missing. Task 5 analysts completed the review of the X-10 "CF" database from 1960-1974, and Young Moon reviewed 26 K-25 boxes, 7 Manhattan Engineering District boxes, and diaries kept by Samuel R. Sapirie, Manager of USAEC Oak Ridge Operations from 1951 to 1972.

In November, the Task 5 team prepared and presented a progress report at the November ORHASP meeting and spoke before the DOE Contractors Records Meeting. Task 5 team members met at length with Pat Turri, Pat Lipford, and Gary Douglas concerning Task 5 methodology and measures to quantify search activities. A total of 91 DSFs were entered, and

an audit of November InMagic files was conducted. At X-10 Lab records, a review was conducted of the databases of CNL, MEMO, M, CL and CF documents from 1960 to 1974.

In December, a meeting was held of Task 5 analysts in Oak Ridge to discuss progress to date, documentation issues, etc. The team continued to add to Incident/Accident database. A total of 213 DSFs were entered, and an audit of December InMagic files was conducted. Young Moon spent 2 weeks in Washington at NARA reviewing all of the Manhattan project boxes and S. R. Sapirie's and Bulch's diaries. Twenty-three interviews submitted to InMagic.

Task 6- Investigation of the Quality of Historical Uranium Effluent Monitoring Data

Members of the Task 6 team continued to gather and analyze documents and other relevant information that describes historical uranium operations and emission sources at the Y-12 and K-25 plants. At the November ORHASP meeting, investigators presented a progress report, with particular emphasis on the availability of monitoring data and on calculations that have been performed to independently estimate past releases of uranium from K-25 purge cascade systems.

Investigators devoted significant efforts toward preparation of the first Task 6 report. This report will contain the following:

- Brief descriptions of key uranium operations, forms of uranium handled, and dates of operation,
- Figures showing the physical location(s) of each key operation,
- Descriptions of mechanisms for release of uranium to the air and surface waters from each key operation,
- Identification of effluent treatment provided (if any), and the likely forms of uranium in effluents,
- Descriptions of monitoring data availability, the extent to which release estimates have been located, the extent to which accidental releases are documented, and the availability of information relevant to estimation of releases,
- Descriptions of strategies that the project team will use to determine the quality of available monitoring data and reported effluent totals, and
- Descriptions of strategies that the project team will use to evaluate the potential magnitude of unmonitored releases.

As part of the effort to evaluate the quality of historical monitoring data, a series of calculations was performed to independently generate estimates of quantities of uranium released from the K-25 purge cascade. The purge cascade represents the only routinely monitored airborne emission point for the K-25 Site. Uranium releases were reconstructed for a time period in each decade

Ms. Bonnie Bashor
February 13, 1996
Page 6

of plant operations, with results ranging from 4 to 15,000 grams of ^{235}U released in the selected periods of approximate one-year duration.

Task 7 - Performance of Additional Screening Calculations

The Task 7 project team responded to comments received from Panel members on the draft report entitled "Screening Methods for the Oak Ridge Dose Reconstruction." Report revision began, and a revised document will be distributed once it is clear that all comments are in.

Task 7 investigators prepared updated "Summary of Data Needs" sheets for the contaminants listed in the Dose Reconstruction contract and for lead. These sheets are used by individuals involved with systematic document searching to help them keep in mind the information requirements for the Task 7 materials of concern. Task 7 investigators also began work on definition of thresholds of concern for additional contaminants that may require screening, including new contaminants identified through document review or interviews. Release quantities or environmental concentrations that are below these conservatively derived levels of concern need not be brought to the attention of the Task 7 team. At the same time, release quantities or environmental concentrations that fall above these levels of concern do not necessarily indicate a significant risk to exposed individuals. Rather, releases above the thresholds will be examined for possible screening under Task 7.

Planning was stepped-up for the assessments on each of the named Task 7 contaminants of concern (arsenic, chromium-VI, lead, asbestos, tritium, neptunium, plutonium, and materials classified by their mere presence). Responsibility for each material will be assigned to a specific individual on the project team, who will collect the requisite information and work with the developers of the Task 7 screening methodology to appropriately address the potential historical doses and health risks of the contaminant.

Please feel free to contact me if you have any questions concerning our progress reports or the status of project activities.

Sincerely,

Thomas E. Widner, CHP, CIH
Principal Environmental Scientist

ATTACHMENT 2

**TENNESSEE CANCER REPORTING SYSTEM
QUALITY IMPROVEMENT PROGRAM
AND
BIRTH DEFECTS VERIFICATION PROGRAM**

1991 Data Review

May 1995

Prepared by

**Oak Ridge Associated Universities
Center for Epidemiologic Research
P.O. Box 117
Oak Ridge, TN 37831-0117**

For

The Department of Health, State of Tennessee

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ABSTRACT

The Center for Epidemiologic Research (CER) at Oak Ridge Associated Universities (ORAU) was contracted by the Department of Health, State of Tennessee (State) to develop and administer a Quality Improvement Program (QIP) for data imported to the Tennessee Cancer Reporting System (TCRS) and to verify expected cases of birth defects. This included but was not limited to the following:

Task 1 - A casefinding study for each hospital that reports or potentially could report cancer data;

Task 2 - A reabstracting study for each hospital that reports cancer data; and

CER began facility visits on October 14, 1993, and ended on December 5, 1994, during which 132 facilities were visited.

Task 1 - Casefinding Study for QIP

The purpose of a casefinding study is to review hospital casefinding procedures and assess whether cases meeting the TCRS requirements are being abstracted. For Task 1, CER compared a computer listing (provided by State) of cases that were reported by each facility for a specific time frame (i.e., all cases whose discharge date was December 1991) to information (non-medical reports) provided by the facility. By comparing these data, CER assessed whether each facility reported all cases that met the reporting criteria for the specific time period being studied. In order to complete Task 1, CER:

1. reviewed all available logs with diagnoses;
2. compared names on logs with names on lists;
3. reviewed charts; and
4. discussed missed cases with facility contact person.

On pages 43-44 are tables showing the sources of missed cases and missed cases by number reported. Another table, Missed Cases by Region, can be found on page 45.

Task 2 - Reabstracting Study for the QIP

The purpose of Task 2 was to assess the agreement between data originally reported to the TCRS and actual information found in the reporting facility's medical records. Another purpose for Task 2 was to identify any problems in data collection and interpretation based on the guidelines and definitions stated in the TCRS manual.

CER notified each facility by telephone requesting a visit along with an explanation of how the study would be conducted. A follow-up letter containing a description of the activities along with a list of cases the facility reported to TCRS within the study time frame. CER reabstracted 1,683 records in the same manner as abstracting new cases. All cases were coded by CER within the guidelines and definitions stated in the TCRS manual within the study time frame. A field by field comparison was made between the reabstracted report and the study facility's original abstract. All coding discrepancies for each item in the required data set were defined as major or minor (pp. 4-8) according to the definitions found in the Table of TCRS Definitions of Major and Minor Discrepancies.

REPORT FOR THE QUALITY IMPROVEMENT PROGRAM: 1991 DATA

Data for the first year of the Quality Improvement Program are based on visits to 132 hospitals in the State of Tennessee. During each hospital visit, a predetermined number of charts were abstracted for comparison with data that were submitted to the Tennessee Cancer Reporting System for the calendar year 1991. The distribution of the number of charts abstracted at the hospitals is listed below. This report will describe the results of the reabstraction study for each variable that was included in the study. The results will be described for the entire sample, and stratified by the number of charts abstracted and region of the state. The sampling scheme that was devised by the state allocated the number of charts to be reabstracted by the number of cancer reports that the hospital reported during 1991. Larger reporting hospitals were to have 25 charts reabstracted; medium reporting hospitals, between 10 and 24, and small reporting hospitals, less than 10.

No. of Charts	Frequency (Percent)	
0	4	(3.0)
1	3	(2.2)
3	4	(3.0)
4	4	(3.0)
5	4	(3.0) Total hospitals=88
6	1	(0.7) Total charts=752
7	2	(1.5)
8	3	(2.2)
9	3	(2.2)
10	63	(46.7)
11	3	(2.2)
12	5	(3.7)
16	2	(1.5)
17	1	(0.7)
18	2	(1.5) Total hospitals=20
20	1	(0.7) Total charts=328
21	3	(2.2)
22	2	(1.5)
23	1	(0.7)
24	3	(2.2)
25	17	(12.6) Total hospitals=24
26	2	(1.5) Total charts=603
27	2	(1.5)

The rest of the report will describe major and minor errors for each variable included in the study and will calculate the errors per hundred charts. A total of 1,683 charts was reabstracted.

VARIABLES

LAST NAME

Only major errors were possible for this variable. The majority of the errors appeared to have occurred from data keying errors rather than the name being completely wrong.

GENERATIONAL ID

There were no errors in any charts for this variable.

FIRST NAME

Only major errors were possible for this variable. The majority of the errors appeared to have occurred due to switching the middle name for the first name rather than data entry errors on this variable.

MIDDLE NAME

Only minor errors were possible for this variable.

SOCIAL SECURITY NUMBER

Only major errors were possible for this variable. The errors appeared to be caused by data entry errors with one digit being incorrect or two digits transposed. The other cause of errors in this variable was inclusion of a spouse's social security number instead of the number of the subject of interest.

STREET NAME

Only minor errors were possible for this variable.

CITY

Only major errors were possible for this variable. Spelling errors were not counted if it was determined that the post office would be able to deliver a letter to the address in spite of the spelling error. Most errors were due to inclusion of a city that was not the city of residence at the time of diagnosis.

STATE

Only major errors were possible for this variable.

ZIP CODE

Only minor errors were possible for this variable. Errors occurred from inclusion of a wrong zip code or failure to include a zip code.

COUNTY/STATE OF RESIDENCE

Only major errors were possible for this variable. There did not seem to be any systematic reason for errors in this variable.

DATE OF BIRTH

Both major and minor errors were possible for this variable. Major errors were generated when the date of birth differed by more than one year. Minor errors were generated when the date of birth differed by one year or less. Most errors appeared to be due to data entry errors and some errors were due to the date of birth not being provided (i.e., 99/99/9999).

RACE

Both major and minor errors were possible for this variable. Major errors were generated when the race was incorrect. Minor errors were generated when the race was listed as unknown when, in fact, the race was in the chart.

SEX

Both major and minor errors were possible for this variable. Major errors were generated when the sex was incorrect. Minor errors were generated when the sex was listed as unknown when, in fact, the sex was in the chart.

OCCUPATION

Both major and minor errors were possible for this variable. Major errors were generated when the occupation was incorrect. Minor errors were generated when the occupation was listed as unknown when, in fact, the occupation was in the chart. The code 913 for "retired" was considered equivalent to 999 "unknown" in the data analysis.

FAMILY HISTORY OF CANCER

Both major and minor errors were possible for this variable. Major errors were generated when the family history of cancer was incorrect. Minor errors were generated when the family history of cancer was listed as unknown when, in fact, the family history of cancer was listed in the chart. Comments by doctors of "negative" or "non-contributory" were classified as "unknown" in the data analysis.

SEQUENCE

Only major errors were possible for this variable. Most errors were from recording the present cancer as the first cancer in the patient when other cancers, particularly skin cancers, had occurred previously.

CLASS OF CASE

Both major and minor errors were possible for this variable. Any difference in the value of an analytic case was considered to be a major discrepancy. Any difference in the value of a non-analytic case was considered to be a minor discrepancy.

HOSPITAL REFERRED FROM

Both major and minor errors were possible for this variable. Major errors were generated when the hospital referred from was incorrect. Minor errors were generated when the hospital referred from was listed as unknown or none when, in fact, the hospital referred from was listed in the chart.

DATE OF DIAGNOSIS

Both major and minor errors were possible for this variable. Major errors were generated when the date of diagnosis was listed as a different calendar year, a difference greater than one month, or listed as unknown when, in fact, the date of diagnosis was in the chart. Minor errors were generated when date of diagnosis was listed as the same calendar year but with a difference of one month or less.

PRIMARY SITE

Both major and minor errors were possible for this variable. Major errors were generated when the first three digits of the primary site (site group) were incorrect. Minor errors were generated when the fourth digit of the primary site (subsite) was incorrect. The most frequent error of subsite was placement of the 9 or 'NOS' code when the chart referred to a specific subsite location.

MORPHOLOGY OR CELL TYPE

Only major errors were possible for this variable. This discrepancy could be in any digit of the four digit morphology code. Most of the discrepancies were due to not selecting a specific category under a particular morphology. For example, coding adenocarcinoma, NOS, when the code should have been mucin-producing adenocarcinoma. Also, many discrepancies were produced from coding the general adenocarcinoma code when it was adenocarcinoma in a villous adenoma (or some variation of this situation).

BEHAVIOR

Only major errors were possible for this variable. This data item referred to the fifth digit of the histology code.

GRADE

Only minor errors were possible for this variable. This data element included the sixth digit of the histology code.

DIAGNOSTIC CONFIRMATION

Only major errors were possible for this variable. This data element is a priority series and each number takes priority over all higher numbers. Most errors appeared to be due to the facility not selecting the lowest number available (i.e., choosing 4="positive microscopic confirmation, NOS" instead of 1="positive histology"). Many of the smaller hospitals consistently chose the 4 code when pathology reports were available in the records. This indicated the possibility of confusion regarding the difference between the 4 and the 1 codes.

PAIRED ORGAN

Only major errors were possible for this variable. Many errors were caused by not realizing that skin of the face and trunk are paired organs.

SITES OF DISTANT METASTASES

Both major and minor errors were possible for this variable. Major errors were generated when the sites of distant metastases were incorrect. Minor errors were generated when the sites of distant metastases were listed as unknown when, in fact, they were in the chart.

SUMMARY STAGE

Both major and minor errors were possible for this variable. Major errors were generated when the summary stage was incorrect. Minor errors were generated when the summary stage was listed as unknown when, in fact, information was available in the chart to determine the extent of disease. Differences in regional stage values (data values 2 through 5) were minor discrepancies (i.e., if the tumor registrar chose a data value 2="regional by direct extension" and the chart indicated the data value 4="regional by direct extension AND to lymph nodes," this was a minor discrepancy).

TABLE OF MAJOR ERRORS BY HOSPITAL SIZE				
Variable	Small N %	Medium N %	Large N %	Total N %
Last name	2 (0.27)	0 (0.00)	3 (0.50)	5 (0.30)
Generational ID	.	.	.	.
First name	7 (0.93)	1 (0.30)	2 (0.33)	10 (0.59)
Middle name	.	.	.	.
Social security	31 (4.12)	9 (2.74)	30 (4.98)	70 (4.16)
Street	.	.	.	.
City	8 (1.06)	0 (0.00)	5 (0.83)	13 (0.77)
State	0 (0.00)	0 (0.00)	4 (0.66)	4 (0.24)
Zip code	.	.	.	.
County	8 (1.06)	1 (0.30)	5 (0.83)	14 (0.83)
Date of birth	4 (0.53)	6 (1.83)	9 (1.49)	19 (1.13)
Race	7 (0.93)	0 (0.00)	5 (0.83)	12 (0.71)
Sex	7 (0.93)	2 (0.61)	2 (0.33)	11 (0.65)
Occupation	18 (2.39)	5 (1.52)	24 (3.98)	47 (2.79)
Family history	12 (1.59)	3 (0.91)	23 (3.81)	38 (2.26)
Sequence	59 (7.84)	19 (5.79)	10 (1.66)	88 (5.23)
Class of case	75 (9.97)	17 (5.18)	21 (3.48)	113 (6.71)
Hospital referred	1 (0.13)	2 (0.61)	3 (0.50)	6 (0.36)
Diagnosis date	20 (2.66)	5 (1.52)	6 (0.99)	31 (1.84)
Primary site	29 (3.86)	19 (5.79)	4 (0.66)	52 (3.09)
Morphology	126 (16.76)	36 (10.98)	47 (7.79)	209 (12.42)
Behavior	14 (1.86)	4 (1.22)	8 (1.33)	26 (1.55)
Grade	.	.	.	.
Diagnostic conf.	133 (17.69)	12 (3.65)	26 (4.31)	171 (10.16)
Paired organ	94 (12.50)	19 (5.79)	25 (4.14)	138 (8.20)
Sites of dis. met.	40 (5.32)	11 (3.35)	38 (6.30)	89 (5.29)
Stage	110 (14.63)	34 (10.36)	66 (10.94)	210 (12.48)

TABLE OF MINOR ERRORS BY HOSPITAL SIZE				
Variable	Small N %	Medium N %	Large N %	Total N %
Last name	.	.	.	.
Generational ID	.	.	.	.
First name	.	.	.	.
Middle name	36 (4.79)	18 (5.49)	28 (4.64)	82 (4.87)
Social security	.	.	.	.
Street	22 (2.92)	11 (3.35)	16 (2.65)	49 (2.91)
City	.	.	.	.
State	.	.	.	.
Zip code	16 (2.13)	8 (2.44)	17 (2.82)	41 (2.44)
County	.	.	.	.
Date of birth	21 (2.79)	6 (1.83)	13 (2.15)	40 (2.38)
Race	5 (0.66)	0 (0.00)	6 (1.00)	11 (0.65)
Sex	.	.	.	.
Occupation	47 (6.25)	28 (8.54)	129 (21.39)	204 (12.12)
Family history	133 (17.69)	52 (15.85)	122 (20.23)	307 (18.24)
Sequence	.	.	.	.
Class of case	5 (0.66)	1 (0.30)	7 (1.16)	13 (0.77)
Hospital referred	23 (3.06)	5 (1.52)	25 (4.14)	53 (3.15)
Diagnosis date	84 (11.17)	14 (4.27)	33 (5.47)	131 (7.78)
Primary site	99 (13.16)	27 (8.23)	58 (9.62)	184 (10.93)
Morphology	.	.	.	.
Behavior	.	.	.	.
Grade	90 (11.97)	44 (13.41)	74 (12.27)	208 (12.36)
Diagnostic conf.	.	.	.	.
Paired organ	.	.	.	.
Sites of dis. met.	31 (4.12)	17 (5.18)	20 (3.32)	68 (4.04)
Stage	40 (5.32)	22 (6.71)	26 (4.31)	88 (5.23)

TABLE OF MAJOR ERRORS BY HOSPITAL LOCATION

Variable	East N %	Middle N %	West N %
Last name	3 (0.43)	1 (0.18)	1 (0.24)
Generational ID	.	.	.
First name	2 (0.29)	5 (0.92)	2 (0.47)
Middle name	.	.	.
Social security	26 (3.74)	23 (4.23)	19 (4.48)
Street	.	.	.
City	6 (0.86)	3 (0.55)	4 (0.94)
State	1 (0.14)	0 (0.00)	3 (0.72)
Zip code	.	.	.
County	4 (0.57)	5 (0.92)	5 (1.18)
Date of birth	3 (0.43)	4 (0.74)	12 (2.83)
Race	4 (0.57)	5 (0.92)	3 (0.72)
Sex	3 (0.43)	5 (0.92)	3 (0.72)
Occupation	24 (3.45)	10 (1.84)	13 (3.07)
Family history	17 (2.44)	4 (0.74)	17 (4.01)
Sequence	33 (4.74)	19 (3.49)	34 (8.02)
Class of case	46 (6.61)	45 (8.27)	21 (4.95)
Hospital referred	2 (0.29)	1 (0.18)	3 (0.72)
Diagnosis date	10 (1.44)	5 (0.92)	16 (3.77)
Primary site	14 (2.01)	19 (3.49)	19 (4.48)
Morphology	71 (10.20)	70 (12.87)	65 (15.33)
Behavior	8 (1.15)	10 (1.84)	8 (1.89)
Grade	.	.	.
Diagnostic conf.	54 (7.76)	62 (11.40)	54 (12.74)
Paired organ	42 (6.03)	50 (9.19)	45 (10.61)
Sites of dis. met.	47 (6.75)	27 (4.96)	15 (3.54)
Stage	101 (14.51)	65 (11.95)	43 (10.14)

TABLE OF MINOR ERRORS BY HOSPITAL LOCATION			
Variable	East N %	Middle N %	West N %
Last name	.	.	.
Generational ID	0 (0.00)	0 (0.00)	0 (0.00)
First name	.	.	.
Middle name	37 (5.32)	27 (4.96)	17 (4.01)
Social security	.	.	.
Street	22 (3.16)	11 (2.02)	16 (3.77)
City	.	.	.
State	.	.	.
Zip code	16 (2.30)	11 (2.02)	14 (3.30)
County	.	.	.
Date of birth	17 (2.44)	12 (2.20)	11 (2.59)
Race	8 (1.15)	3 (0.55)	0 (0.00)
Sex	.	.	.
Occupation	114 (16.38)	42 (7.72)	48 (11.32)
Family history	162 (23.28)	67 (12.32)	73 (17.22)
Sequence	.	.	.
Class of case	9 (1.29)	1 (0.18)	3 (0.71)
Hospital referred	18 (2.59)	19 (3.49)	16 (3.77)
Diagnosis date	43 (6.18)	52 (9.56)	34 (8.02)
Primary site	78 (11.21)	52 (9.56)	51 (12.03)
Morphology	.	.	.
Behavior	.	.	.
Grade	76 (10.92)	79 (14.52)	51 (12.03)
Diagnostic conf.	.	.	.
Paired organ	.	.	.
Sites of dis. met.	29 (4.17)	17 (3.12)	19 (4.48)
Stage	34 (4.88)	29 (5.33)	25 (5.90)

DISTRIBUTION OF ERRORS

LAST NAME **(major)**

LNAME	FREQUENCY	PERCENT
0	127	96.2
1	5	3.8

TOTAL = 5 (0.30)

BY SIZE

2 (0.27)	0 (0.00)	3 (0.50)
SMALL	MEDIUM	LARGE

BY REGION

3 (0.43)	1 (0.18)	1 (0.24)
EAST	MIDDLE	WEST

FIRST NAME (major)

LNAME	FREQUENCY	PERCENT
0	122	92.4
1	10	7.6

TOTAL = 10 (0.59)

BY SIZE

7 (0.93)	1 (0.30)	2 (0.33)
SMALL	MEDIUM	LARGE

BY REGION

2 (0.29)	5 (0.92)	2 (0.47)
EAST	MIDDLE	WEST

MIDDLE NAME (minor)

LNAME	FREQUENCY	PERCENT
0	81	61.4
0.01	35	26.5
0.02	7	5.3
0.03	6	4.5
0.04	1	0.8
0.05	1	0.8
0.06	1	0.8

TOTAL = 82 (4.87)

BY SIZE

36 (4.79) 18 (5.49) 28 (4.64)
SMALL MEDIUM LARGE

BY REGION

37 (5.32) 27 (4.96) 17 (4.01)
EAST MIDDLE WEST

SOCIAL SECURITY NUMBER **(major)**

SSN	FREQUENCY	PERCENT
0	87	65.9
1	29	22.0
2	11	8.3
3	3	2.3
4	1	0.8
6	1	0.8

TOTAL = 70 (4.16)

BY SIZE

31 (4.12) 9 (2.74) 30 (4.98)
SMALL MEDIUM LARGE

BY REGION

26 (3.74) 23 (4.23) 19 (4.48)
EAST MIDDLE WEST

STREET ADDRESS (minor)

STREET	FREQUENCY	PERCENT
0	94	71.2
0.01	32	24.2
0.02	4	3.0
0.04	1	0.8
0.05	1	0.8

TOTAL = 49 (2.91)

BY SIZE

22 (2.92)	11 (3.35)	16 (2.65)
SMALL	MEDIUM	LARGE

BY REGION

22 (3.16)	11 (2.02)	16 (3.77)
EAST	MIDDLE	WEST

CITY **(major)**

CITY	FREQUENCY	PERCENT
0	120	90.9
1	11	8.3
2	1	0.8

TOTAL = 13 (0.77)

BY SIZE

8 (1.06)	0 (0.00)	5 (0.83)
SMALL	MEDIUM	LARGE

BY REGION

6 (0.86)	3 (0.55)	4 (0.94)
EAST	MIDDLE	WEST

STATE (major)

STATE	FREQUENCY	PERCENT
0	129	97.7
1	2	1.5
2	1	0.8

TOTAL = 4 (0.24)

BY SIZE

0 (0.00)	0 (0.00)	0 (0.00)
SMALL	MEDIUM	LARGE

BY REGION

1 (0.14)	0 (0.00)	3 (0.72)
EAST	MIDDLE	WEST

ZIP CODE **(minor)**

ZIP	FREQUENCY	PERCENT
0	98	74.2
0.01	27	20.5
0.02	7	5.3

TOTAL = 41 (2.44)

BY SIZE

16 (2.13)	8 (2.44)	17 (2.82)
SMALL	MEDIUM	LARGE

BY REGION

16 (2.30)	11 (2.02)	14 (3.30)
EAST	MIDDLE	WEST

COUNTY (major)

CO_ST	FREQUENCY	PERCENT
0	119	90.2
1	12	9.1
2	1	0.8

TOTAL = 14 (0.83)

BY SIZE

8 (1.06)	1 (0.30)	5 (0.83)
SMALL	MEDIUM	LARGE

BY REGION

4 (0.57)	5 (0.92)	5 (1.18)
EAST	MIDDLE	WEST

DATE OF BIRTH (major and minor)

DOB	FREQUENCY	PERCENT
0	92	69.7
0.01	23	17.4
0.02	8	6.1
1	5	3.8
1.01	1	0.8
2	1	0.8
5	1	0.8
6	1	0.8

TOTAL = 19 (1.13) major
40 (2.38) minor

BY SIZE

4 (0.53)	6 (1.83)	9 (1.49)	MAJOR
21 (2.79)	6 (1.83)	13 (2.15)	MINOR
SMALL	MEDIUM	LARGE	

BY REGION

3 (0.43)	4 (0.74)	12 (2.83)	MAJOR
17 (2.44)	12 (2.20)	11 (2.59)	MINOR
EAST	MIDDLE	WEST	

RACE (major and minor)

RACE	FREQUENCY	PERCENT
0	115	87.1
0.01	1	0.8
0.02	3	2.3
0.03	1	0.8
1	11	8.3
1.01	1	0.8

TOTAL = 12 (0.71) major
11 (0.65) minor

BY SIZE

7 (0.93)	0 (0.00)	5 (0.83)	major
5 (0.66)	0 (0.00)	6 (1.00)	minor
SMALL	MEDIUM	LARGE	

BY REGION

4 (0.57)	5 (0.92)	3 (0.72)	major
8 (1.15)	3 (0.55)	0 (0.00)	minor
EAST	MIDDLE	WEST	

SEX (major)

SEX	FREQUENCY	PERCENT
0	121	91.7
1	11	8.3

TOTAL = 11 (0.65)

BY SIZE

7 (0.93)	2 (0.61)	2 (0.33)
SMALL	MEDIUM	LARGE

BY REGION

3 (0.43)	5 (0.92)	3 (0.72)
EAST	MIDDLE	WEST

OCCUPATION (major and minor)

OCC	FREQUENCY	PERCENT
0	51	38.6
0.01	18	13.6
0.02	15	11.4
0.03	3	2.3
0.04	3	2.3
0.05	4	3.0
0.06	1	0.8
0.08	1	0.8
0.09	1	0.8
0.1	1	0.8
0.18	1	0.8
0.19	1	0.8
1	10	7.6
1.01	8	6.1
1.02	2	1.5
1.03	1	0.8
1.04	1	0.8
1.06	1	0.8
2	3	2.3
2.03	1	0.8
2.1	1	0.8
3.01	2	1.5
3.02	1	0.8
5.03	1	0.8

TOTAL = 47 (2.79) major
 204 (12.12) minor

BY SIZE

18 (2.39)	5 (1.52)	24 (3.98)	major
47 (6.25)	28 (8.54)	129 (21.39)	minor
SMALL	MEDIUM	LARGE	

BY REGION

24 (3.45)	10 (1.84)	13 (3.07)	major
114 (16.38)	42 (7.72)	48 (11.32)	minor
EAST	MIDDLE	WEST	

FAMILY HISTORY OF CANCER (major and minor)

FAM HIST	FREQUENCY	PERCENT
0	31	23.5
0.01	26	19.7
0.02	18	13.6
0.03	8	6.1
0.04	8	6.1
0.05	7	5.3
0.06	2	1.5
0.07	3	2.3
0.08	1	0.8
1	3	2.3
1.01	4	3.0
1.02	2	1.5
1.03	3	2.3
1.05	1	0.8
1.06	1	0.8
1.07	2	1.5
1.08	1	0.8
1.1	2	1.5
1.11	1	0.8
2.01	2	1.5
2.02	1	0.8
2.03	1	0.8
2.06	1	0.8
2.08	1	0.8
3.05	1	0.8
3.06	1	0.8

TOTAL = 38 (2.26) major
307 (18.24) minor

BY SIZE		
12 (1.59)	3 (0.91)	23 (3.81) major
133 (17.69)	52 (15.85)	122 (20.23) minor
SMALL	MEDIUM	LARGE

BY REGION		
17 (2.44)	4 (0.74)	17 (4.01) major
162 (23.28)	67 (12.32)	73 (17.22) minor
EAST	MIDDLE	WEST

SEQUENCE (major)

SEQUENCE	FREQUENCY	PERCENT
0	73	55.3
1	39	29.5
2	14	10.6
3	4	3.0
4	1	0.8
5	1	0.8

TOTAL = 88 (5.23)

BY SIZE

59 (7.84) 19 (5.79) 10 (1.66)
SMALL MEDIUM LARGE

BY REGION

33 (4.74) 19 (3.49) 34 (8.02)
EAST MIDDLE WEST

CLASS OF CASE **(major and minor)**

COC	FREQUENCY	PERCENT
0	56	42.4
0.01	7	5.3
0.03	1	0.8
1	43	32.6
1.01	2	1.5
2	12	9.1
2.01	1	0.8
3	5	3.8
4	2	1.5
6	2	1.5
7	1	0.8

TOTAL = 113 (6.71) major
13 (0.77) minor

BY SIZE

75 (9.97)	17 (5.18)	21 (3.48)	major
5 (0.66)	1 (0.30)	7 (1.16)	minor
SMALL	MEDIUM	LARGE	

BY REGION

46 (6.61)	45 (8.27)	21 (4.95)	major
9 (1.29)	1 (0.18)	3 (0.71)	minor
EAST	MIDDLE	WEST	

HOSPITAL REFERRED FROM **(major and minor)**

HOSP REF	FREQUENCY	PERCENT
0	94	71.2
0.01	20	15.2
0.02	10	7.6
0.03	1	0.8
0.08	1	0.8
1	4	3.0
1.01	2	1.5

TOTAL = 6 (0.36) major
53 (3.15) minor

BY SIZE

1 (0.13)	2 (0.61)	3 (0.50)	major
23 (3.06)	5 (1.52)	25 (4.14)	minor
SMALL	MEDIUM	LARGE	

BY REGION

2 (0.29)	1 (0.18)	3 (0.72)	major
18 (2.59)	19 (3.49)	16 (3.77)	minor
EAST	MIDDLE	WEST	

DIAGNOSIS DATE (major and minor)

DIAG DTE	FREQUENCY	PERCENT
0	58	43.9
0.01	22	16.7
0.02	14	10.6
0.03	6	4.5
0.04	6	4.5
0.06	1	0.8
0.07	1	0.8
0.09	1	0.8
1	10	7.6
1.01	4	3.0
1.03	1	0.8
1.06	1	0.8
2	5	3.8
2.03	1	0.8
3.01	1	0.8

TOTAL = 31 (1.84) major
131 (7.78) minor

BY SIZE

20 (2.66)	5 (1.52)	6 (0.99)	major
84 (11.17)	14 (4.27)	33 (5.47)	minor
SMALL	MEDIUM	LARGE	

BY REGION

10 (1.44)	5 (0.92)	18 (3.77)	major
43 (6.18)	52 (9.56)	34 (8.02)	minor
EAST	MIDDLE	WEST	

PRIMARY SITE **(major and minor)**

PRIMARY	FREQUENCY	PERCENT
0	35	26.5
0.01	22	16.7
0.02	19	14.4
0.03	8	6.1
0.04	5	3.8
0.06	1	0.8
0.07	2	1.5
1	10	7.6
1.01	10	7.6
1.02	5	3.8
1.03	4	3.0
1.04	1	0.8
1.09	1	0.8
2	1	0.8
2.01	3	2.3
2.02	1	0.8
2.03	1	0.8
3.01	2	1.5
3.05	1	0.8

TOTAL = 52 (3.09) major
 184 (10.93) minor

BY SIZE

29 (3.86)	19 (5.79)	4 (0.66)	major
99 (13.16)	27 (8.23)	58 (9.62)	minor
SMALL	MEDIUM	LARGE	

BY REGION

14 (2.01)	19 (3.49)	19 (4.48)	major
78 (11.21)	52 (9.56)	51 (12.03)	minor
EAST	MIDDLE	WEST	

MORPHOLOGY (major)

MORPH	FREQUENCY	PERCENT
0	30	22.7
1	43	32.6
2	28	21.2
3	17	12.9
4	12	9.1
5	1	0.8
6	1	0.8

TOTAL = 209 (12.42)

BY SIZE

126 (16.76)	36 (10.98)	47 (7.79)
SMALL	MEDIUM	LARGE

BY REGION

71 (10.20)	70 (12.87)	65 (15.33)
EAST	MIDDLE	WEST

BEHAVIOR **(major)**

BEHAVIOR	FREQUENCY	PERCENT
0	110	83.5
1	20	15.2
3	2	1.5

TOTAL = 28 (1.55)

BY SIZE

14 (1.86)	4 (1.22)	8 (1.33)
SMALL	MEDIUM	LARGE

BY REGION

8 (1.15)	10 (1.84)	8 (1.89)
EAST	MIDDLE	WEST

GRADE (minor)

GRADE	FREQUENCY	PERCENT
0	42	31.8
0.01	32	2.2
0.02	28	21.2
0.03	15	11.4
0.04	7	5.3
0.05	4	3.0
0.06	2	1.5
0.07	1	0.8
0.08	1	0.8

TOTAL = 208 (12.36)

BY SIZE

90 (11.97)	44 (13.41)	74 (12.27)
SMALL	MEDIUM	LARGE

BY REGION

76 (10.92)	79 (14.52)	51 (12.03)
EAST	MIDDLE	WEST

DIAGNOSTIC CONFIRMATION (major)

DIAGCONF	FREQUENCY	PERCENT
0	65	49.2
1	32	24.2
2	16	12.1
3	4	3.0
4	4	3.0
5	3	2.3
6	2	1.5
7	1	0.8
8	1	0.8
9	3	2.3
10	1	0.8

TOTAL = 171 (10.16)

BY SIZE

133 (17.69)	12 (3.65)	26 (4.31)
SMALL	MEDIUM	LARGE

BY REGION

54 (7.76)	62 (11.40)	54 (12.74)
EAST	MIDDLE	WEST

PAIRED ORGAN **(major)**

PAIR	FREQUENCY	PERCENT
0	52	39.4
1	49	37.1
2	20	15.2
3	2	1.5
4	5	3.8
5	2	1.5
6	1	0.8
7	1	0.8

TOTAL = 138 (8.20)

BY SIZE

94 (12.50)	19 (5.79)	25 (4.14)
SMALL	MEDIUM	LARGE

BY REGION

42 (6.03)	50 (9.19)	45 (10.61)
EAST	MIDDLE	WEST

SITES OF DISTANT METASTASES
(major and minor)

SODM	FREQUENCY	PERCENT
0	49	37.1
0.01	18	12.1
0.02	7	5.3
0.03	2	1.5
0.04	2	1.5
1	26	19.7
1.01	8	6.1
1.02	2	1.5
2	6	4.5
2.01	6	4.5
3	3	2.3
3.01	1	0.8
3.02	1	0.8
4	1	0.8
4.01	1	0.8
6.02	1	0.8

TOTAL = **89 (5.29) major**
 68 (5.23) minor

BY SIZE

40 (5.32)	11 (3.35)	38 (6.30)	major
31 (4.12)	17 (5.18)	20 (3.32)	minor
SMALL	MEDIUM	LARGE	

BY REGION

47 (6.75)	27 (4.96)	15 (3.54)	major
29 (4.17)	17 (3.12)	19 (4.48)	minor
EAST	MIDDLE	WEST	

SUMMARY STAGE (major and minor)

STAGE	FREQUENCY	PERCENT
0	25	18.9
0.01	9	6.8
0.02	3	2.3
1	17	12.9
1.01	13	9.8
1.02	4	3.0
1.03	1	0.8
2	13	9.8
2.01	12	9.1
2.02	5	3.8
2.03	2	1.5
2.05	1	0.8
3	9	6.8
3.01	4	3.0
3.04	1	0.8
4	2	1.5
4.01	2	1.5
4.02	1	0.8
5	2	1.5
5.01	2	1.5
6.01	1	0.8
7	2	1.5
7.01	1	0.8

TOTAL = 210 (12.48) major
88 (5.23) minor

BY SIZE
110 (14.63) 34 (10.36) 66 (10.94) major
40 (5.32) 22 (5.71) 26 (4.31) minor
SMALL MEDIUM LARGE

BY REGION
101 (14.51) 65 (11.95) 43 (10.14) major
34 (4.88) 29 (5.33) 25 (5.90) minor
EAST MIDDLE WEST

RECOMMENDATIONS FOR TRAINING BASED ON THE RESULTS OF THE REABSTRACTION STUDY

Search the chart for occupation. The occupation was frequently recorded as '999' or unknown when this variable was in the chart. Discussion of where in the chart occupation may be found may benefit abstraction of this variable.

Give examples of frequently found statements regarding family history of cancer during training and specifically address how each statement should be interpreted. Statements in the chart such as 'negative' or 'non-contributory' are frequently misinterpreted as 'no' family history of cancer.

Sequence was frequently reported as the first occurrence of cancer when the patient had a previous cancer. Discussion of where previous cancer information may be located in the chart would be helpful during training. Consultation reports are particularly useful. Also, discussion of the fact that a previous skin cancer counts in the sequence is needed.

The date of collection of the pathology specimen should be used as the date of diagnosis, not the date of the pathology report. This difference rarely results in a discrepancy of more than one to two days in the date of diagnosis, but it should still be reinforced that the date of collection is the preferred date.

The chart should be abstracted after a reasonable amount of time has passed since the initial diagnosis. This will help with identification of the primary site, which may be unknown at the time of the identification of cancer, but becomes known after a rather lengthy period of work-up. This will also help with staging, particularly if the patient comes in for an initial biopsy and is admitted a week or two later for a complete work-up and radical excision around the original biopsy site.

The last digit of the primary site should be abstracted more frequently. Many records contained the '9' code or NOS when the exact location of the cancer within the organ was clearly stated in the chart. Training should include lists of locations within the chart where this code may be located. The use of the operative report, pathology report, and imaging studies should be stressed.

When assigning the grade to the tumor, the pathology report should be used, not the face sheet or discharge summary.

Training should be enhanced for small hospitals in the use of the diagnostic confirmation codes. A frequent error occurs almost exclusively in these hospitals where the code '4' is chosen when the code '1' should be chosen.

The fact that skin is a paired organ should be stressed during training.

RESULTS FROM THE CASEFINDING STUDY

The casefinding study identified 462 missed cases among the 132 hospitals where casefinding studies were conducted. The major source of missed cases was the diagnostic index, with 64.7% of the missed cases being identified from this source. Pathology logs and pathology reports were the second most frequent source of missed cases with 32.0% of the cases being identified from this source. The table on page 43 identifies all sources of missed cases and cross references missed cases that were ascertained from multiple sources.

The table on page 44 describes the number of missed cases by the number of cases reported by the hospital during the period of the casefinding study. The data were divided in quartiles depending on the number of cases reported to the State during the casefinding study period. The first quartile contains information for 31 hospitals that reported less than 5 cases to the State registry during the period of the casefinding study. These hospitals in the lowest quartile of reporting missed 154 cases for every 100 cases reported. The highest reporting quartile, reporting 47 or more cancers during the period of the casefinding study, missed only 6 cases per 100 reported. The number of missed cases was inversely proportional to the number of cases reported.

The table on page 45 examines the number of missed cases by region of the State. Middle Tennessee hospitals had the most missed cases per cases reported ratio with 18 missed per 100 reported. East and West Tennessee had similar proportions of missed cases with 9 and 11 cases missed per 100 reported respectively. Looking at the average number of cases reported during the time period of the casefinding study, it is apparent that the hospitals in Middle Tennessee report fewer cases than those in East and West Tennessee. On the average, hospitals in Middle Tennessee reported 22.57 cases during the casefinding study period and those in East and West Tennessee reported 32.86 and 32.0, respectively. The fact that Middle Tennessee hospitals are missing more cases, therefore, is likely to be a function of having more small reporting hospitals in Middle Tennessee than in the other two territories.

Recommendations for improvement of casefinding in all hospitals are based on examination of the tables presented in this report and review of hospital reports filed for all the hospitals in this study.

The diagnostic index and pathology logs or reports should be used at the very least for casefinding. These two sources provided 77% of the missed cases.

Increase training in smaller hospitals and in hospitals in Middle Tennessee. Small hospitals and those in Middle Tennessee were shown to have the highest case missed to case reported ratio.

Multiple sources of ascertainment should be used. Although 77% of the missed cases were identified from the combination of the diagnostic index and pathology reports, outpatient, oncology, and surgery logs were also productive in identifying cases that were missed by both the diagnostic index and the pathology sources.

Cases were frequently missed if they were "diagnosed, but not treated" and "treated, but not diagnosed" so these categories should be stressed in training. Those in the "diagnosed, but not treated" category were frequently seen in one day surgery for a biopsy and apparently chose to have surgery or complete work-up at another facility. Those that were "treated, but not diagnosed" had frequently had a biopsy at another facility that removed all of the cancerous lesion and were admitted to the second facility for a more radical excision or re-excision.

Reporting of outpatients should be emphasized. Most hospitals were reporting outpatients, but some hospitals were not reporting any outpatients, which caused these hospitals to have large numbers of missed cases in the casefinding study.

An audit should be done every year to ensure that reported cases are on the TCRS files. Many missed cases had not actually been missed, but for some reason the data for the case did not appear on the final list of 1991 data. It is recommended that each reporting hospital check each abstract against the final list for the year to make sure that all cases that were abstracted are represented.

Sources of Missed Cases

	DI	PATH	RT	OP	ONC	NM	SX	RAD	DR INDEX
Diagnostic Index (DI) (64.7%)	224	45	2	2	4		9	1	
Pathology (PATH) (32.0%)	45	86	1	1			2		1
Rad Therapy (RT) (4.1%)	2	1	12						
Out Patient (OP) (3.2%)	2	1		11					
Oncology (ONC) (4.8%)	4				18				
Nuclear Med (NM) (0.2%)						1			
Surgery (SX) (6.7%)	9	2					20		
Radiology (RAD) (1.3%)	1							5	
Reabstraction (1.1%)									5

$$DI + P + RT = 4$$

$$DI + P + SX = 7$$

$$DI + P + OP = 1$$

Missed Cases by Number Reported								
	No. Hospital	Avg. Reported	Σ	Avg. Reviewed	Σ	Avg. Missed	Σ	No. Missed/ 100 Reported
<5	31	1.42	44	8.32	258	2.19	68	154
$\geq 5-15$	34	9.38	319	12.68	431	2.50	85	27
>15-47	33	24.54	810	17.36	573	4.30	142	17
>47	34	75.65	2,572	33.94	1,154	4.91	167	6
							462	

Missed Cases by Region								
Region	No. Hospital	Avg. Reported	Σ	Avg. Reviewed	Σ	Avg. Missed	Σ	No. Missed/ 100 Reported
East	49	32.86	1,610	19.02	932	2.98	146	9
Middle	49	22.57	1,106	15.59	764	4.06	199	18
West	31	32.00	992	22.16	687	3.55	110	11

ATTACHMENT 3

*salary
information
removed.*