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December 4, 2002

Dockets Management Branch
(HFA-305)
Food and Drug Administration
5630 Fishers Lane
Room 1061
Rockville, MD 20857

Re: Docket Number 00D-1539: *Draft Guidance for Industry - 21 CFR Part 11; Electronic Records; Electronic Signatures – Maintenance of Electronic Records*; 67 Federal Register 56848; September 5, 2002

Dear Sir/Madam:

The following comments on the above noted draft Guidance are submitted on behalf of the Pharmaceutical Research and Manufacturers of America (PhRMA). PhRMA represents the country's leading research-based pharmaceutical and biotechnology companies. Our member companies are devoted to inventing medicines that allow patients to lead longer, happier, healthier, and more productive lives. In 2001, our members invested over \$30 billion in the discovery and development of new medicines.

PhRMA has commented to the FDA regarding difficulties in addressing the broad array of compliance issues associated with 21 CFR Part 11. A recent survey of PhRMA member companies highlighted the significant regulatory cost that the industry will have to bear. When asked the question about the cost to fully remediate all applicable systems to come into Part 11 compliance, PhRMA companies reported an aggregate figure of over \$2.1 billion. A portion of this amount will be spent on implementing long-term record maintenance capabilities and any guidance issued by the FDA will have a marked impact on the final cost of compliance. This is particularly problematic in this area as there are few technical solutions available that give industry the confidence that they will work over the entire retention period of all records. Long-term retention of electronic records and related hardware and software presents a significant financial and resource burden to industry. Furthermore, it adds risk with little or no benefit to public health. Long-term requirements have the greatest potential for creating significant costs where those costs will not be clearly understood until time has passed.

In late August the FDA announced an initiative to enhance pharmaceutical Good Manufacturing Practices (GMPs). As part of this initiative, the Agency shifted the lead on implementation of Part 11 to Center for Drug Evaluation and Research (CDER), with continued involvement from the other Centers and the Office of Regulatory Affairs. It is expected that as part of this initiative that emerging science and data analysis will be

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used to enhance compliance programs to target the highest risk areas. Since this will refocus Agency thinking on a number of the aspects of Part 11 compliance, all draft Guidance documents issued to date will need to be significantly revised. PhRMA urges the FDA should adopt a risk-based approach to Part 11 compliance that is in keeping with the Agency's GMP initiative.

PhRMA also encourages the FDA to adopt a risk-based approach to record maintenance that is in line with the predicate rules for record retention. These rules were written without electronic records and electronic signatures in mind. Hybrid solutions, paper plus electronic or an admixture of both, should be acceptable until pragmatic electronic solutions become prevalent.

PhRMA has a major concern over the apparent request for reprocessing of records throughout their required retention period. *Section 5.5, The Ability to Process and Electronic Record's Information Throughout Its Records Retention Period Shall be Preserved*, and *Section 6.2.1.4, The Ability to Process Information In Electronic Records Should be Preserved*, includes text such as "...if you could automatically search for words in the text of an electronic record, sort or find values in a table, or perform calculations in a spreadsheet, you should be able to process information in a like manner for the electronic record over the entire records retention period." Reprocessing could require additional software, hardware and data to be retained to assist in the re-processing effort. This could also mean additional application development should a member of industry choose the "Electronic Records Migration Approach" of maintaining their electronic records. There is a major difference between being able to reprocess on demand, and being able to achieve identical results. PhRMA believes that this matter was never contemplated as the original regulation was being developed. As such, this is an inappropriate interpretation of the rule and should be rejected on those grounds.

Our detailed comments appended to this letter track the Draft Guidance by line number (also included). In sum, PhRMA believes that this Draft Guidance requires substantive modification because as presently constituted it cannot be practically implemented, does not adequately track the regulation and ignores a risk-based approach to compliance.

Sincerely,



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PhRMA Comments on Draft Guidance for Industry - 21 CFR Part 11; Electronic Records; Electronic Signatures –
Maintenance of Electronic Records

Detailed Comments

#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
1	General	All	<p>Make sure all topics are either:</p> <ol style="list-style-type: none"> 1. Relevant to all data formats (e.g., does this guidance make sense for relational data bases)? 2. Identified as specific to a format of data (e.g., a topic might make sense only when applied to a document). <p>Provide specific guidance for handling the most common types of records – at a minimum, for records in relational databases.</p>	<p>The means used to maintain e-Records depends significantly on the type of data. Many of the topics and examples in the guidance are relevant to documents, but there are many other forms in which e-Records are maintained including notably relational data bases, files of instrument data output, images and new proprietary file formats supporting emerging science and technologies.</p>
2	General	All	<p>Clearly support a risk-based approach to records maintenance in the guidance. Present specific guidance on subjects where the amounts of raw data produced are huge, such as Process Analytical Technology (PAT). This guidance should be structured to ensure that Part 11 is not a reason for failure to adopt technologies such as PAT that have the potential to further protect the public health. Guidance should recognize that there are no guaranteed permanent technical solutions and limited commercially available solutions to meet the long-term retention requirement. Further, the guidance should include the FDA's current thinking on ways to achieve a migration without unnecessary costs to industry.</p>	<p>Many of the requirements of Part 11 are reasonable and increasingly feasible in new systems today. However, the technologies and standards needed to maintain records over long periods are not yet available. This coupled with the exponential growth in generated data and the risk of compliance with records maintenance requirements will prove to be too costly without a benefit to public health.</p>
3	General	All	<p>Explicitly state in the guidance that the older the record, the longer it will take to recover it.</p>	<p>For records still in their FDA retention period but not in active use, one major source of cost comes if industry must maintain the ability to produce ANY of these records as quickly as they must produce records in active use.</p>

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4	General	All	Change all uses of the term "process" to "preserve and present".	The term "process" implies an expectation to reprocess electronic records over its retained life cycle, a complex and sometimes unachievable expectation due to licensing, changing technology, etc. This seems to be an unnecessary burden. It makes practical sense that records, history, audit trails, etc. be reconstructed. Retained electronic records should not be reprocessed. In some cases (example, line 260, line 380) the term reconstruct is used in the document. This should be the consistent message. Reprocessing appears to constitute new, additional requirements for records not previously explicitly identified in predicate rules or in the Part 11 regulation. Reprocessing is not possible for paper records.
5	General	All	Provide clarification to define expectations for when electronic records retention practices begin (e.g., at the moment the final record is created). Include some consideration for differences in expectation for short term vs. long-term electronic record retention.	Identifies a life cycle for retained electronic records incorporating risk considerations. Risk of electronic records to quality, health and safety will decrease over time.
6	General	All	Clarify differences in maintaining e-records that are 'live', backed up, and truly archived. Suggest subsections that define what is required for each scenario.	Different activities apply to maintaining active records, to those backed up and those that are archived.
7	General	All	The FDA should consider acceptance of the Victorian Electronic Records Strategy (VERS) (wherein the metadata are based on a model developed by the National Archives of Australia), as referenced in the US General Accounting Office (GAO) Information Management: Challenges in Managing and Preserving Electronic Records document (GAO-02-0586, June 2002).	This solution reflects wrapping PDF with XML, thus allowing long-term record maintenance. At present, FDA would disallow this because of requirements to reprocess (see comment on Section 5.5). Emulation is another possibility that should be investigated and considered.
8	1	88	Change "principles and procedures" to "principles and practices."	See line 105 in Scope. We believe the agency's intent is to describe practices, not procedures. Procedures can imply something more formal on the part of the manufacturers.
9	2	99	Replace "...compatible with FDA's public health responsibilities." with "...generally equivalent to paper records and handwritten signatures executed on paper."	There is no need to substitute new wording for the wording in the original rule. The new wording does not confer clarity and introduces new areas of debate on interpretation.

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10	2	100	Restate or refer to comment 71 of the Part 11 Preamble, which says that there is no requirement to maintain a legacy hardware environment.	The scope of the document should be clarified to emphasize the maintenance of electronic records only. It should clearly state that there is no intention to require the maintenance of the application software or its system environment.
11	2	101	The guidance states "When an FDA regulation requires that a record be maintained, generally the regulation specifies the period of time the record must be kept...". There should be additional guidance as to what FDA's expectation would be for required records where the regulation does not state specific record retention period.	This may be a predicate rule issue but nevertheless a general guidance from the FDA would be helpful (e.g., the answer may be that in the absence of specific agency information on record retention period the regulated entity should define such retention period internally).
12	2	103	Change sentence to "We intend companies to determine the risk to product quality and patient health and safety with regard to the retention of data"	This allows for judgment to be applied, thus allowing for resource and effort to be focused on the most critical information.
13	2.1 and 6.2.1.1	121,384, 381	Add to 'Production Values and conditions' to include some illustrative examples (e.g., mixing time and room humidity). Define the phrase, "Production Values and conditions". (E.g., '22' is a value and a condition is temperature of the room?)	In deciding the scope of Part 11 for a given system, persons may interpret the word "product" or "article" in such a way to support their rationale. Therefore, use of the phrase "Regulated Articles" and "Regulated Product" should be clarified and if necessary, defined. For Example: The word "product" can be interpreted as: <ul style="list-style-type: none"> • Marketed finished product only • Marketed and Investigational finished products only • Marketed and Investigational finished products including Active Pharmaceutical Ingredients • Marketed and Investigational finished products including Active Pharmaceutical Ingredients and Excipients

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
14	2.1	124-125	Replace "However, this draft guidance only applies to records that, by predicate rule, you are required to maintain." with "This draft guidance applies to records that, by predicate rule, are required to be maintained, as well as records submitted to the FDA as per the Act and the PHS Act, even if such records are not specifically identified in predicate rule."	<p>As currently written, this section does not address the fact that 21 CFR Part 11 (see below) applies to all records submitted to the FDA, regardless of any predicate rule requirements: 21 CFR Part 11.1 (b) This part applies to records in electronic form that are created, modified, maintained, archived, retrieved, or transmitted, under any records requirements set forth in agency regulations. This part also applies to electronic records submitted to the agency under requirements of the Federal Food, Drug, and Cosmetic Act and the Public Health Service Act, even if such records are not specifically identified in agency regulations.</p> <p>The current passage can be literally interpreted to mean that Part 11 does not apply to records that are created in support of GXP activities but not specifically stated within the predicate regulations. If this is the intent of the guideline then it should be spelled out more clearly.</p>

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
15	3	All	<p>Include definitions with each guidance document and include them in overall glossary.</p> <p>Here is a suggestion of some terms to define: Reprocess Reconstruct (refer to definition in Part 58; and the Industry Coalition e-Archive working group white paper) Archive Backup Metadata Authenticity, trustworthiness</p> <p>PhRMA offers the following definitions that have been prepared by groups such as NIST and the PDA:</p> <p>Cyclic Redundancy Check (CRC): (1) A method to detect and correct errors by adding bits derived from a block or string of bits to the block. (2) An algorithm to compute bits characteristic of a block based on the algebra of polynomials over the integers, modulo 2. (3) The characteristic bits of a block.</p> <p>Data Conversion: Automated exporting or importing of records from one software environment to another, where the underlying bit stream is altered without loss of content or context.</p> <p>Migration: The transfer of electronic records and related metadata from an existing operating system platform or software program to a new revised platform without the loss of data or record integrity.</p>	<p>Agency and Information Technology professionals often use the same words in significantly different ways.</p> <p>Use of terms that are not clearly defined in the glossary creates confusion.</p> <p>Definitions should include lists (and “not limited to”). Theoretical definitions like “Meta data is data about data” don’t help because some data about data would not be needed to meet the requirements of the regulation. Do not paraphrase the regulation.</p> <p>Additional terms should be defined for the maintenance of electronic records that were previously not defined in the Glossary of Terms.</p>

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
15	3		<p>Processable Electronic Records: Records in native file formats that can be read, analyzed, interpreted and manipulated by current and future hardware and software that can read the native file structure. File structures exportable to other file formats are typically searchable and analyzable but are not in the native file formats as created by the original software. Records that can only be viewed and/or printed are retrievable and reproducible but not processable.</p> <p>Reproducible Electronic Records: Records that can be read and presented to display or print using current and future hardware and software. Presentation should accurately reflect the physical and logical features present at the time the record was committed to durable media.</p> <p>Usability: A usable record is one that can be located, retrieved, presented and interpreted.</p>	
16	4.1	172	Change "Accordingly, the signature manifestation information, associated with an electronic record that is subject to this requirement, must be maintained for the duration of the record retention period." to "Accordingly, the printed name of the signer, the date and time of signing and what the signature means, associated with an electronic record that is subject to this requirement, must be maintained for the duration of the record retention period."	It is constructive to describe what constitutes the "signature manifestation information".
17	4.1	181-182	Delete "authentic, and compatible with the FDA's public health responsibilities."	How is "authentic" different from "trustworthy"? Why introduce a new term to be debated? Why the "compatible..." phrase that does not shed any more clarity and introduces a new subject of debate on interpretation?

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
18	4.2	186-188	<p>Guidance should clearly acknowledge that records are in parts and that when they are migrated to new systems or moved to archival storage, that the original look and feel and some data precision may be lost.</p> <p>Guidance should explicitly allow that industry will achieve compliance only over time as marketplace solutions and industry standard data formats evolve to meet the requirements of regulation.</p> <p>Predicate rules should be reviewed and clarified:</p> <ul style="list-style-type: none"> • To reduce ambiguities (Part 58 should redefine "automated data collection system" to clearly include or exclude "manual entry of data into a computer") • To use appropriate computing terms and concepts (what is the electronic equivalent of "initials"...something that is clearly stated in several rules • To require the retention of raw data for shorter periods of time than the summary record when it can be demonstrated that only summary data is significant (e.g. PAT) 	<p>"... Electronic records ... must be retained for as long as the predicate rule requires."</p> <p>Predicate rules (GLP, GMP and GCP) were written for a period where records were usually paper documents. Now, many records are composed of multiple data elements in multiple tables in relational databases and never exist as a single "object". And, in many cases, records as defined in predicate rules are in several different computer systems and/or parts still on paper. It should be permissible to retain the enormous volumes of "raw data" (e.g., lab instrument digital sampling, clinical data, etc.) for shorter periods than for the key parameters (e.g. contextual information, operating conditions, etc.), intermediate results and final results derived via validated processes</p> <p>Part 11 guidance is needed to increase the understanding of the long term retention aspects of the Predicate Rules as it pertains to e-Records, e.g., 21 CFR Part 58:</p> <ul style="list-style-type: none"> a) 58.3 Definitions (k) Raw data definition, b) 58.190 Archives, c) 58.195 Retention of records.
19	5.1	205-206	Delete the bullet: "The technical approach to long term electronic record storage (e.g., electronic records migration, as described below); and"	It is not feasible to specify the technical approach to long-term electronic record in record protection procedures, due to the pace of change in that technology.
20	5.2.1	All	Include use of procedures to the list of controls.	Procedures are a significant factor in assuring reliability and integrity of maintained electronic records.
21	5.2.1	208	Replace the heading number "5.2.1" with the heading number "5.2."	Current heading number is incorrect.

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
22	5.2.1	210	Change "You should identify and control factors that could potentially affect the reliability of electronic records during their records retention periods." to: "You should identify and, to the extent possible, address factors that could potentially affect the reliability of electronic records during their records retention periods."	It is important to recognize that not all factors identified may be controllable.
23	5.2.1	213-214	Clarify meaning and intent of 2nd bullet "Data encoded within an electronic record (e.g., computer readable representations of information);"	The meaning of current text is not clear.
24	5.2.1	217	Change to "Electronic media (e.g., disk or tape) that record an electronic record and its associated metadata."	As in line 213, it's not just "data." Add Electronic as in line 248. If it is the intent of FDA to apply Part 11 to flash memory devices, this should be stated more directly and with accompanying guidance. Including flash memory in a list of example types of media is not sufficient guidance as to the applicability and practices required for flash memory
25	5.3	225	Add "Archived" before "Electronic Record" in heading.	Seems an unnecessary burden for active records.
26	5.3	227-235	Replace: " You should periodically access a representative number of electronic records to ensure that record contents can still be read and evaluated throughout the records retention period." with "A requirement to develop and use SOPs for the refreshing / rewriting of backup media, with the duration being based on vendor-supplied data."	<p>The validated duration of the media must be established and trusted, rather than relying on a periodic check. Periodic rewinding of tapes may be necessary to assure the tape remains useful during useful life of the media, but this would be a normal method of assuring usability of the media and not a verification of the readability. Similar approaches for floppy disks or CD-ROMS may not be useful.</p> <p>The example provided is reflective of older technology and is not helpful.</p> <p>Suppliers and producers of electronic recording media should be relied upon to provide recommendations for handling/use of their products. However, information on performance characteristics for types of media should be provided by independent testing sources, versus the suppliers and producers themselves.</p>

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
27	5.3	245	<p>Add new paragraph to the end of this section:</p> <p>“For the purpose of long term retention, electronic records may be retained in a format that differs from the original, which may include a format that offers less dependence on technology and offers a broader probability for readability.”</p>	<p>It is important to recognize the merits that de-facto database standards and ‘Technology Neutral Formats’ offer for the long-term retention of required electronic records. Although the rule does not state we cannot do this, it is important to recognize the role these approaches will play in the future.</p> <p>There are a number of unsubstantiated statements (e.g., electronic records are generally more perishable than traditional paper records) in the paragraph that confer no additional clarity or guidance.</p>
28	5.4	250	<p>Replace “You should monitor the conditions under which the electronic records are stored. We believe that suppliers and producers of recording media can be a good source of information about specifications and precautions regarding such factors as temperature, humidity, dust, vibration, and sources of electromagnetic and radio frequency interference.” with “You should monitor the temperature and humidity conditions, as required, under which the electronic records are stored. We believe that suppliers and producers of recording media can be a good source of information about specifications and precautions regarding temperature and humidity.”</p>	<p>The current sentence implies that the agency expects storage conditions of retained electronic records to be recorded to document the act of monitoring. Such factors as temperature and humidity can be monitored by a BAS system (or manually via chart recorder) but dust, vibration and sources of electromagnetic and radio frequency interference cannot be easily monitored with an existing BAS.</p>

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
29	5.5	General Section Comment	<p>It would be appropriate for the agency to point out that, for example, a .pdf "picture" of a spreadsheet is not computer readable, in that it obscures the processing rules and that such a copy does not meet the "computer readable" requirement of the rule.</p> <p>The guidance should use the concept of "reconstruction" (already used in Part 58) rather than "reprocessing" where, as needed and given some time, the processing of a record could be recreated using current programming and tools –recognizing that the look and feel will differ and that producing results that are exactly the same is often not possible.</p> <p>We suggest that a solution is to define in the system requirements the minimum detail or precision required to meet the intended purpose. This would allow a subsequent reduction in the volume, precision or density of the data without meaningful loss.</p> <p>Use instead, " the ability to process information in an electronic record should not diminish in terms of their use in new, contemporary applications. Their use in new applications however is limited to the capabilities of the new software."</p>	<p>Maintaining the ability to process records appears to be a substantial expansion of the scope of Part 11.</p> <p>In many cases, it is not feasible, given available technology today, to maintain the ability to reprocess records for the retention period without incurring significant costs and risk – far in excess of the benefit to the public health.</p> <p>We are concerned that the lack of clarity in defining "reprocessing" will lead inspectors to require 100% identical results, which is frequently not feasible.</p> <p>The ability to reprocess a record is not necessary for meeting the Part 11 requirement that we be "able to generate electronic copies of electronic records that are suitable for FDA inspection, review and copying". Section 11.10(b) specifies that we must be able to "generate accurate and complete copies of records in both human readable and electronic form..." If the result of the reprocessed record is already itself stored as an electronic record, then the need to maintain the software and hardware required to re-create that processing to reproduce the record is a costly and burdensome requirement: need to maintain old hardware, software and trained experts who need to know the older technologies. "Reprocessing" and "Process" need to be better defined.</p>

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				The ability to reprocess all electronic records subject to 21 CFR Part 11 is not required by Predicate Rules or by 21 CFR Part 11 itself. This requirement would most likely prevent the use of technology neutral formats or of standard archival formats (e.g., ASCII). "For example, if you could automatically search for words in the text of an electronic record, sort or find values in a table, or perform calculations in a spreadsheet, you should be able to process information in a like manner for the electronic record over the entire records retention period. This ability (or functionality) derives largely from the hardware and software used to extract information from the electronic record, as well as the electronic record format itself. This ability should be included among the specifications in company procedures and controls.
30	5.5	258-9	Change the first sentence to read: "The ability to generate accurate and complete copies of records should be preserved"	Maintaining process capability of the old system is a substantial expansion of scope of Part 11 functional requirements that should go through the proper FDA rule making process rather than being introduced via guidance. Acceptable alternatives are addressed in the predicate rules. For example in the GMPs section 211.180 (d) and the GLPs section 58.195 (g), the rule states "Records required by this part may be retained either as original records or as true copies such as photocopies, microfilm, microfiche, or other accurate reproductions of the original records." This clearly shows the intent to retain the information and does not require reprocessing. Requirements for reprocessing should be limited to those stated in a predicate rule and not introduced through Part 11 guidance(s).
31	5.5	273	Eliminate the term "manipulate".	Implies manipulation of previously approved electronic records is an acceptable practice.
32	5.5	276-279	Delete the example.	Eliminate intention to reprocess archived electronic records.
33	5.6	291	Delete the phrase: "...from Draft Guidance For Industry - Not For Implementation 12..."	
34	5.6	293	Change "validated" to "verified" at the end of the sentence.	Validate is a complex activity. We validate the copy process. In cases where there is not built in error checking we would consider adding a verification ("copy checked") step into the process.

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35	6	298	After the 1 st sentence, which ends "...to maintain a particular electronic record." insert the sentence, "For the purpose of long-term retention, electronic records may be retained in a format that differs from the original, which may include a format that offers technological independence and comparable readability."	De-facto database standards and technology neutral formats offer merits for the long-term retention of required electronic records.
36	6	301	Include text on other potentially viable electronic archiving solutions, including emulation, technology neutral formats, and standard formats.	The Guidance makes specific reference to the time capsule and migration approaches and recognizes the use of both or other approaches that meet the requirements. However, other viable approaches are excluded. These include conversion to standard archival and technology neutral formats, emulation and universal file viewers. Some of these approaches have been given serious considerations by other US agencies and foreign governments as well. The viability of the VERS (Victorian Electronic Records Strategy) approach is gaining recognition (PDF with XML wrapper). FDA should consider these, and other approaches, as viable alternatives.
37	6.1	General Comment	Replace this section with one which defines what is needed to access and/or retrieve archived records for cases when adequate migration is not achievable	The objective of this approach appears to be necessary to support reprocessing of electronic records, an action we do not normally perform. It is also a very impractical approach, as stated in the draft guidance.
38	6.1	310	End the sentence with "...software or hardware." Delete the phrase "upgrades would constitute a migration, an approach explained below."	Upgrade of an application, an operating system, and in some cases even upgrading a database system to a new version generally does not constitute or require a data migration. It is a normal activity during the course of an application's life that is handled by change control procedures to ensure that the system and its data remain in a validated state.
39	6.1	323-324	Change "Relatively short" to "Relatively short (1-3 years)" and change "Relatively low cost" to "Relatively low cost (<\$5000)"	Clarifies what FDA means by these ambiguous terms.

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40	6.2	336	<p>After the last sentence in the 1st paragraph, which ends "...throughout the records retention period." add the sentence</p> <p>"When electronic records are migrated from one system to another, there might be unavoidable losses or changes in certain information or record attributes that do not diminish the reliability of information that is preserved and presented. It is not uncommon to lose data during migrations - metadata is especially vulnerable. The keys are to not lose anything mandated by predicate rules, and to thoroughly document what is migrated, what is not migrated, and why."</p>	<p>This important point (a variation of which is currently presented in Section 6.2.1.5) speaks realistically about the unavoidable changes that are part of data migration, and should be presented at the beginning of this discussion on the electronic records migration approach.</p> <p>If the migrated records meet the requirements of the applicable predicate rules, there is not a need to have an expectation to preserve the old electronic records.</p>
41	6.2	337-363	<p>The agency should provide clear definitions of such terms as migration, conversion, transformation, etc. are provided in the Glossary of Terms.</p> <p>Propose deleting all the text within these line numbers.</p>	<p>This part of this Section reflects back on the time capsule approach, which is neither practical nor reasonable in most cases.</p> <p>A primary reason for migrating data from a legacy system to a new system or archiving data from a legacy system to another data repository is so that the legacy system can be retired.</p> <p>Migration is described as a move from old to new system, but whether the underlying bit stream is altered is not discussed. Ultimately, the conversion of data is where the real problems begin.</p> <p>Migration and conversion are not defined in the currently draft of the FDA Glossary of Terms. Although, most of the time the term migration is used to describe both a conversion and a move of records or data.</p> <p>If the migrated records meet the requirements of the applicable predicate rules, there is not a need to have an expectation to preserve the old electronic records.</p>
42	6.2.1	365-374	<p>This text is acceptable only if clear definitions of such terms as migration, conversion, transformation, etc. are provided in the Glossary of Terms.</p>	<p>In this Section, the term migration is described as a transformation of the old electronic record. As above, a clear definition of migration is necessary.</p>
43	6.2.1.2	393	<p>Replace the phrase "...electronic record..." with "...electronic record(s)..."</p>	<p>Migration is not always a one-to-one transfer. Multiple records can be combined and/or single records can be split into multiple records.</p>

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#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
44	6.2.1.2	397	Correct word from "liability" to "reliability"	Typographical error
45	6.2.1.3	General Comment	<p>Guidance should clearly allow the retention of original audit trail data in separate electronic files or tables where it is not possible to move the original audit trail data into the new system.</p> <p>Guidance should clearly allow the validated "resolution" (where a 2 becomes either 7 or "hypertension") of coded data where there is no loss of meaning or content and clearly allow the destruction of electronic code list meta-data from retired systems when adequately documented in the validation of the migration and/or the retirement.</p>	<p>"Where a migration, in effect, creates a new electronic record (by transforming the old electronic record) then, per section 11.10(e), the audit trail for the migrated electronic record would have to cover this creation. By adding this new creation step to the migrated audit trail carried over from the old electronic record you will help ensure a continuity of electronic record integrity."</p> <p>In systems using relational databases, moving data to a new system usually involves both a change to: The data mapping (where there is no 1 to 1 correspondence between data in the old and new system) and, The coding of data (where a 2 used to mean "hypertension" but now is coded as "7").</p>
		422	After the sentence that ends with "...delete electronic records", add the sentence "It is not necessary to keep audit trails for deleted records beyond the original records retention period."	<p>The first problem cannot be managed in any audit trail scheme used today. The second problem requires clear guidance.</p> <p>Finally, almost no commercial software can accept the importation of audit trail data from a separate system.</p> <p>The new system can be designed such that the audit trail distinguishes the difference between a created-record and a migrated-record. However if the requirement is to ensure that the old system has the audit trail functionality to capture the migration event then an unnecessary technical remediation will be required for the old system before migrating to the new system. If the latter is the intent of the guideline then it should be acceptable to track migration event using procedural means rather than implementing a technical solution (e.g. recording the migration event(s) in a dedicated log book).</p>

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PhRMA Comments on Draft Guidance for Industry - 21 CFR Part 11; Electronic Records; Electronic Signatures –
Maintenance of Electronic Records

#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
46	6.2.1.3	422-426	<p>Replace “Where a migration, in effect, creates a new electronic record (by transforming the old electronic record) then, per section 11.10(e), the audit trail for the migrated electronic record would have to cover this creation. By adding this new creation step to the migrated audit trail carried over from the old electronic record you will help ensure a continuity of electronic record integrity.” with “The audit trail in the legacy system needs to be migrated to the new system or otherwise available for inspection, review and copying. The migration process must be documented for traceability purposes. A separate electronic audit trail record for the migrated records is not also required.”</p>	<p>Assuming the migration from the legacy and new systems is documented, this appears to be an unnecessary step and one that is not typically supported by commercial software, thus adding to the effort and cost of migration with limited incremental value.</p> <p>This also represents a shift from FDA's original premise for requiring audit trail's. A migration represents machine actions that can be specified, designed, built and tested, similar to device operations. In preamble comment 72, “At this time, the agency's primary concern relates to the integrity of human actions. Should the agency's experience with part 11 demonstrate a need to require audit trails of device operations and entries, the agency will propose appropriate revisions to these regulations.”</p>
47	6.2.1.4	439	<p>Change the paragraph heading to read: “The Ability to Inspect Information In Electronic Records Should Be Preserved”</p>	<p>Section 5.5 and Section 6.2.1.4 indicate that, in addition to protecting the record throughout the records retention period, the ability to process that record in the original way should be protected. This is not an explicit requirement of 21 CFR 11. There is no regulatory requirement to retain system functionality.</p>
		441	<p>Change the word “process” in the first sentence to “Inspect”.</p>	<p>New requirements should not be introduced via guidances. Guidances should be used to clarify points already established in the Rule. There is no requirement in 21 CFR Part 11 for long-term processing of the records. The Rule only states that electronic records must be accurate, complete, human readable and in an electronic form suitable for inspection, review, and copying.</p>
		442	<p>Replace “In the migration approach, the new computer system should enable you to search, sort and process information in the migrated electronic record at least at the same level as what you could attain in the old system (even though the new system may employ different hardware and software).” with “In the migration approach, the new computer system should be capable of making copies of the records in human and computer readable form which can be searched, sorted and processed by the FDA.</p>	<p>There is no guarantee that the new software will preserve all the functions of old, outdated and unsupported software. In fact it is more than likely, and has been proven by experiences to date, that new versions of software have different functions.</p> <p>For example, in a chromatography, a system might be used to collect the original data. If the software is updated many times, the algorithm to calculate the results might change, so the report generated from the original data might be different. Further, files become incompatible with newer versions of software.</p>

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Maintenance of Electronic Records

#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
48	6.2.1.4	443-444	Delete this section. There is no obligation to maintain software tools and functionality of prior systems that may have been used in the creation or modification of an e-record.	The text makes clear implication that subsequent software applications working on e-records generated from an earlier system must include all functionality of the earlier computer system. This has nothing to do with the maintenance of e-records. The document is mixing the role of software applications, tools, and analytic techniques with the preservation of e-records and their integrity.
49	6.2.1.5	451	Instead of disallowing “differences and losses” in records required by predicate rule, allow industry to define the requirements of data and records in a system and then allow any differences or losses that are not significant to the meaning of the data.	“Unavoidable Differences And Losses...” We are pleased that the agency recognizes the fact that such events are “unavoidable”. Unfortunately, the realities that create differences and losses apply to <u>all</u> data in a system – not just those that are not mentioned in the predicate rules.
50	6.2.1.5	452-454	Delete the 1 st sentence in the 1 st paragraph, which begins “When electronic records are migrated...” After the 1 st sentence, which ends “...Reliability of information that is preserved and presented.” insert the sentence, “The fundamental objective of the migration is to preserve the essential meaning of the information as judged by experts in the field to be equivalent to the original in the context of its stated, actual or intended use.”	This important point speaks realistically about the unavoidable changes that are part of data migration, and should be presented at the beginning of this discussion on the electronic records migration approach (and is thus proposed to be added to the end of the 1 st paragraph in Section 6.2). Migration to new systems may result in changes in appearance as well as analytical result calculation precision from the original system, while still acknowledging that it is important that the essential meaning of the information not change and that only that information relevant to the essential meaning needs to be migrated.
51	6.2.1.5	456–457	Eliminate sentence, “It should be clear that this caveat does not apply to losses or changes in information specifically mandated by predicate rules.”	If FDA rightfully understands that unavoidable changes may occur, it appears inconsistent to follow up with a statement that it is unacceptable.
52	6.2.1.5	461,495	Do not require that validation files or other documentation that describe the creation, modification, migration or retirement of an electronic system be electronic just because the system is electronic.	This suggests that all validation records must be electronic. This is unnecessary to preserve the integrity of the data and would represent a significant burden on industry with no value in preserving the public health.
53	6.2.1.5	461,495	Remove the word “electronic”	It isn’t necessary to require the documentation to be electronic. In some situations it may be easier to access a paper document than an electronic document.

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Maintenance of Electronic Records

#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
54	6.2.1.5	463-487	Clarify that "...a trusted 3 rd party outside the organization" does not have to be another company.	We are pleased that the agency is presenting detailed examples to help clarify their concerns. Of course, this creates new questions.
55	6.2.1.5	463-487	Clarify that these sentences apply only to the situation where existing digital signatures are being migrated.	All electronic records, even those to which an electronic signature is applied, do not necessarily include digital signature.
56	6.2.1.5	463-487	A specific example is given for verifying the migration of digital signatures using a 3 rd party to verify the digital signature in the old system prior to migration. This 3 rd party applies a new "notarized" digital signature in the new system attesting to the authenticity of the original digital signature, which can no longer be verified in the new system.	<p>As stated, it appears you are only prepared to support this method of digital signature migration.</p> <p>An alternative approach is permitted by the National Archives and Records Administration, as outlined in Section 4.3 of the "Records Management Guidance for Agencies Implementing Electronic Signatures" and cited in the Appendix to this guidance.</p> <p>This alternate approach involves maintaining "adequate documentation of the records' validity, such as trust verification records, gathered at or near the time of record signing." With respect to this approach, NARA further states in that same section "Maintaining adequate documentation of validity gathered at or near the time of record signing may be preferable for records that have permanent or long-term retentions since it is less dependent on technology and much more easily maintained as technology evolves over time."</p>
57	6.2.1.5	471-473	Replace "Just prior to performing the electronic record migration a trusted third party from outside of the organization that has some responsibility for the electronic record verifies the digital signature using the old system methods:" with "Just prior to performing the electronic record migration a trusted third party verifies the digital signature using the old system methods. The trusted third party should be independent from the organizational unit responsible for the electronic record and may be an independent service provider from outside the corporation regulated by the FDA.	Current sentence is confusing. Clarification is needed on who is an acceptable 3 rd party. Assuming organization to mean company, "Trusted Third Parties" may be inside the organization for establishing digital certificates.
58	6.2.1.5	478	Replace line 478 with "The migrated records must maintain the integrity of the association of signers (people) and records. The above trusted third party then applies a new digital signature (their own)."	It must be clear that one is not migrating the signature itself, but rather migrating a representation of the fact of the signature and adding a new signature of testimony by a trusted third party.

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 Maintenance of Electronic Records

#	Clause/ Sub clause	Line #	Proposed change	COMMENTS
59	6.2.1.5	487+	Add a new bullet: <ul style="list-style-type: none"> ▪ "Preserve the printed name of the signer, the date and time of signing, and the meaning of the signature associated with an electronic record as a means of preserving the original signing information." 	Although the original digital signature is invalidated by a migration, the original signing information must be preserved (i.e., name, date, time, meaning).
60	6.2.1.5	488-499	Rewrite for clarity. Isn't it sufficient to document the mapping for the conversion and then use the new colors?	<p>We are pleased that the agency is presenting complex examples to help clarify their concerns. In this example, we find the explanation somewhat confusing and "...text (that referred to the colors) in the migrated electronic record should not be altered because doing so would change the record content and authenticity." would seem to lead to potentially serious errors in human viewing of the record.</p> <p>Assuming the migration from the legacy and new systems is documented, this appears to be an unnecessary step and one that is not typically supported by commercial software, thus adding to the effort and cost of migration with limited incremental value.</p>
61	6.2.1.5	497-499	Replace "However, text (that referred to the colors) in the migrated record should not be altered because doing so would change the record content and authenticity." with "The text (that referred to the colors) may be altered to be consistent with the new colors."	Transcribing of the text to refer to the new colors is required to preserve the essential meaning of the record in a manner that is easily understood. Requiring literal text be preserved and to be understood by humans in a convoluted fashion, especially after multiple migrations, could lead to human error of serious consequence. Migrations of text need not be any more literal than migrations of numbers that may change in literal representation from one system to the next. The key-determining factor should be whether the migrated record preserves the essential meaning of the original record (i.e., judged by experts in the field to be equivalent to the original in the context of its stated, actual or intended use). Any such transcription can be documented as part of the migration process. Further, this requirement is not typically supported by commercial software.

2 **Guidance for Industry**

3 **21 CFR Part 11; Electronic Records;**

4 **Electronic Signatures**

5 **Maintenance of Electronic Records**

6 ***Draft Guidance***

7 **This guidance document is being distributed for comment purposes only.**

8 Comments and suggestions regarding this draft document should be submitted
9 within 90 days of publication in the *Federal Register* of the notice announcing the
10 availability of the draft guidance. Submit comments to Dockets Management Branch
11 (HFA-305), Food and Drug Administration, 5630 Fishers Lane, room 1061,
12 Rockville, MD 20852. All comments should be identified with the docket number
13 00D-1539.

14 For questions regarding this draft document contact Paul J. Motise, Office of
15 Enforcement, Office of Regulatory Affairs, 301-827-0383, e-mail:
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17 U.S. Department of Health and Human Services
18 Food and Drug Administration
19 Office of Regulatory Affairs (ORA)
20 Center for Biologics Evaluation and Research (CBER)
21 Center for Drug Evaluation and Research (CDER)
22 Center for Devices and Radiological Health (CDRH)
23 Center for Food Safety and Applied Nutrition (CFSAN)
24 Center for Veterinary Medicine (CVM)
25 July 2002

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21 CFR Part 11; Electronic Records;

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Electronic Signatures

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Maintenance of Electronic Records

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Additional copies of this draft guidance document are available from the Office of

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Enforcement, HFC-200, 5600 Fishers Lane, Rockville, MD 20857; Internet

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http://www.fda.gov/ora/compliance_ref/part11/default.htm

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July 2002

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Guidance For Industry

21 CFR Part 11; Electronic Records;

Electronic Signatures

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Maintenance of Electronic Records

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This draft guidance, when finalized, will represent the Food and Drug Administration's (FDA's) current thinking on this topic. It does not create or confer any rights for or on any person and does not operate to bind FDA or the public. An alternative approach may be used if such approach satisfies the requirements of applicable statutes and regulations.

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1. Purpose

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The purpose of this draft guidance is to describe the Food and Drug Administration's

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(FDA's) current thinking regarding principles and procedures for maintaining electronic

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records in electronic form in meeting the requirements of Part 11 of Title 21 of the Code

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of Federal Regulations; Electronic Records; Electronic Signatures. It provides guidance

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to industry, and is intended to assist persons who are subject to the rule to comply with

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the regulation. It may also assist FDA staff who apply part 11 to persons who are subject

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to the regulation.

¹ This draft guidance was prepared under the aegis of the Office of Enforcement by the FDA Part 11 Compliance Committee. The committee is composed of representatives from each center within the Food and Drug Administration, the Office of Chief Counsel and the Office of Regulatory Affairs.

95 2. Scope

96 This draft guidance is one of a series of guidances about part 11. We intend to provide
97 information with respect to FDA's current thinking on acceptable ways of meeting part 11
98 requirements to ensure that electronic records and electronic signatures are trustworthy,
99 reliable, and compatible with FDA's public health responsibilities. This draft guidance
100 focuses on maintenance of electronic records.

101 When an FDA regulation requires that a record be maintained, generally the regulation
102 specifies the period of time the record must be kept (referred to in this draft guidance as
103 the records retention period). We intend this draft guidance to apply to the entire required
104 retention period regardless of how actively the records are used or accessed.

105 This draft guidance presents key principles and practices and addresses some frequently
106 asked questions, but it is not intended to cover everything about maintaining electronic
107 records. The guidance provides two examples of approaches to electronic record
108 maintenance.

109 This document includes some considerations that are also relevant to recording
110 information in the first place. If information is inaccurately or incompletely
111 recorded, record maintenance practices will not compensate for those shortcomings.

112 2.1 Applicability

113 Part 11 applies to electronic records and electronic signatures that persons create, modify,

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115 maintain, archive, retrieve, or transmit under any records or signature requirement set
116 forth in the Federal Food, Drug, and Cosmetic Act (the Act), the Public Health Service
117 Act (PHS Act), or any FDA regulation. Any requirements set forth in the Act, the PHS
118 Act, or any FDA regulation, with the exception of part 11, are referred to in this
119 document as predicate rules. Most predicate rules are contained in Title 21 of the Code of
120 Federal Regulations. In general, predicate rules address the research, production, and
121 control of FDA regulated articles, and fall into several broad categories. Examples of
122 such categories include, but are not limited to: manufacturing practices, laboratory
123 practices, clinical and pre-clinical research, adverse event reporting, product
124 tracking, and pre and post marketing submissions and reports. However, this draft
125 guidance only applies to records that, by predicate rule, you are required to maintain.

126 **2.2 Audience**

127 We intend this draft guidance to provide useful information and recommendations to:

- 128 • Persons subject to part 11;
129 • Persons responsible for the maintenance of electronic records; and,
130 • Persons who develop products or services to enable implementation of part 11
131 requirements;

132 This draft guidance may also assist FDA staff who apply part 11 to persons subject to the
133 regulation.

134 **3. Definitions and Terminology**

135 Unless otherwise specified below, all terms used in this draft guidance are defined in

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137 FDA's draft guidance document, "Guidance For Industry, 21 CFR Part 11; Electronic
138 Records; Electronic Signatures, Glossary of Terms," a document common to the series of
139 guidances on part 11.

140 **4. Regulatory Requirements**

141 *4.1 What Does Part 11 Require?*

142 Part 11 has several requirements relevant to maintenance of electronic records. For
143 example:

- 144 • Section 11.10 requires persons to "employ procedures and controls designed to
145 ensure the authenticity, integrity, and, when appropriate, the confidentiality of
146 electronic records, and to ensure that the signer cannot readily repudiate the
147 signed record as not genuine." To satisfy this requirement persons must, among
148 other things, employ procedures and controls that include "[P]rotection of
149 records to enable their accurate and ready retrieval throughout the records
150 retention period." See section 11.10(c).

151 Other part 11 requirements apply throughout the record retention period. Therefore, you
152 should take the requirements below, among others, into account as you plan and
153 implement your electronic records maintenance activities. Here are some examples:

- 154 • Section 11.10(a): "Validation of systems to ensure accuracy, reliability,

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consistent intended performance, and the ability to discern invalid or altered

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records.”

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- Section 11.10(b): “The ability to generate accurate and complete copies of

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records in both human readable and electronic form suitable for inspection,

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review, and copying by the agency.”

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- Section 11.10(d): “Limiting system access to authorized individuals.”

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- Section 11.10(e): Use of secure, computer-generated, time-stamped, audit trails

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that, among other things, "shall be retained for a period at least as long as that

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required for the subject electronic records and shall be available for agency

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review and copying.”

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- Section 11.50: Signed electronic records shall contain information associated

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with the signing that clearly indicates the printed name of the signer, the date

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and time of signing and what the signature means. These items shall be "subject

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to the same controls as for electronic records and shall be included as part of

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any human readable form of the electronic record (such as electronic display or

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printout)." Accordingly, the signature manifestation information, associated

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with an electronic record that is subject to this requirement, must be maintained

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for the duration of the record retention period.

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- Section 11.70: "Electronic signatures and handwritten signatures executed to

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electronic records shall be linked to their respective electronic records to ensure

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178 that the signatures cannot be excised, copied, or otherwise transferred to falsify
179 an electronic record by ordinary means.”

180 Implementation of these and other part 11 controls will help to ensure that your
181 maintained electronic records will be trustworthy, reliable, authentic, and compatible
182 with FDA's public health responsibilities.

183 ***4.2 What Do Predicate Rules Require?***

184 In addition to establishing records retention periods, predicate rules, among other
185 things, establish record content and signing requirements. It is beyond the scope of this
186 document to enumerate these requirements. However, keep in mind that electronic
187 records must still meet predicate rule content and signing requirements, and they must be
188 retained for as long as the predicate rule requires.

189 **5. General Considerations For Electronic Records Maintenance**

190 We believe it is very important that the factors unique to the maintenance of electronic
191 records are controlled and work properly together so that people can accurately and
192 readily retrieve and use the information that was originally intended to be preserved and
193 presented. We believe the following principles and practices will help meet that
194 objective.

196 **5.1 *Procedures For Electronic Records Maintenance Should Be Established and***
197 ***Followed.***

198 As noted under Section 4 of this document, Section 11.10(c) requires that you employ
199 procedures and controls for the protection of records to enable their accurate and ready
200 retrieval throughout the records retention period. You should update the procedures and
201 controls as conditions warrant. Procedures should describe:

- 202 • How electronic records will be maintained;
- 203 • Storage conditions and precautions;
- 204 • Retrieval and access restrictions;
- 205 • The technical approach to long term electronic record storage (e.g.,
206 electronic records migration, as described below); and,
- 207 • Personnel responsibilities for relevant tasks.

208 **5.2.1 *Factors That Might Affect The Reliability Of Electronic Records During the***
209 ***Required Retention Period Should Be Identified And Controlled.***

210 You should identify and control factors that could potentially affect the reliability of
211 electronic records during their records retention periods. These factors include, but are
212 not limited to:

- 213 • Data encoded within an electronic record (e.g., computer readable
214 representations of information);
- 215 • Metadata for an electronic record (e.g., information that gives the data meaning
216 and context, such as data dictionaries for databases);
- 217 • Media (e.g., disk, tape, or flash memory devices) that record data and metadata;
- 218 • Hardware used to retrieve and display the electronic record;

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- 220 • Software (both application programs and operating systems) used to read,
221 process, and display electronic records; and,
 - 222 • The processes of extracting and presenting information in human readable form.
- 223 If these factors are not controlled properly the information that the electronic records
224 should convey might not be complete, accurate, or usable.

225 ***5.3 Continued Availability And Readability Of Electronic Record***
226 ***Information Should Be Ensured.***

227 You should periodically access a representative number of electronic records to ensure
228 that record contents can still be read and evaluated throughout the records retention
229 period. For example, if you store electronic records on reels of magnetic tape, you should,
230 on a pre-established schedule, rewind the tape and ensure you can still read the electronic
231 records. We believe that suppliers and producers of electronic recording media have
232 specific scientific information relating to the performance characteristics and limitations
233 of the media. Therefore, those suppliers and producers should be a good source of
234 information about how frequently you should try to access the electronic records.
235 Literature searches may also provide useful information in this regard.

236 If you find that you are starting to have difficulty reading the electronic records we
237 believe it would be highly advisable to subject them to data recovery procedures and/or
238 transcribe them onto fresh electronic recording media before the degradation renders the
239 electronic records unrecoverable. Because electronic records are generally more
240 perishable than traditional paper records, you should make back up electronic copies of

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242 your most important electronic records and store them separately from the primary
243 electronic records. For example, we believe it would not be prudent to store both primary
244 and backup electronic records on the same computer hard drive because both could be
245 lost if the hard drive fails.

246 ***5.4 Electronic Records Should Be Stored Under Appropriate Environmental***
247 ***Conditions.***

248 You should determine what storage conditions are appropriate for the specific electronic
249 record media, and then maintain those conditions throughout the records retention period.
250 You should monitor the conditions under which the electronic records are stored. We
251 believe that suppliers and producers of recording media can be a good source of
252 information about specifications and precautions regarding such factors as temperature,
253 humidity, dust, vibration, and sources of electromagnetic and radio frequency
254 interference. Literature searches might also provide useful information about these
255 factors.

256 ***5.5 The Ability To Process An Electronic Record's Information Throughout Its***
257 ***Records Retention Period Should Be Preserved.***

258 Throughout the records retention period, the ability to process information in an
259 electronic record should not diminish. By being able to process the information, you
260 would maintain the ability, for example, to effectively and efficiently reconstruct events,
261 detect and investigate problems, detect trends and assess the need to modify procedures

263 or specifications to improve product quality, safety, and effectiveness. Some FDA
264 regulations require that records be maintained so that data in the records can be used for
265 periodically evaluating product quality standards to determine the need for changes in
266 product specifications, or manufacturing or control procedures – see 21 CFR 211.180(e),
267 for example. In addition, maintaining an electronic record in a form that permits the
268 record's information to be processed should help you to meet the part 11 requirement that
269 you be able to generate electronic copies of electronic records that are suitable for FDA
270 inspection, review, and copying. See section 11.10(b), as mentioned above in Section 4 of
271 this document. The ability to process information in an electronic record is a key aspect
272 of whether certain electronic records are suitable for FDA inspection and review.

273 Accordingly, where you could use computer technologies to search, sort, or manipulate
274 information in an original electronic record, you should be able to use computer
275 technologies to perform the same kinds of processing on information in the maintained
276 electronic record. For example, if you could automatically search for words in the text of
277 an electronic record, sort or find values in a table, or perform calculations in a
278 spreadsheet, you should be able to process information in a like manner for the electronic
279 record over the entire records retention period. This ability (or functionality) derives
280 largely from the hardware and software used to extract information from the electronic
281 record, as well as the electronic record format itself. You should include this ability
282 among your specifications in your procedures and controls.

284 ***5.6 Copying Processes Should Produce Accurate And Complete Copies.***

285 You may find it necessary to copy electronic records from time to time during their
286 records retention periods (e.g., from one type of disk to the same or different
287 type of disk). One reason for this copying may be to compensate for wear and
288 tear on media. We believe that it is very important that information not be lost or
289 altered in the copy process. Some systems have a built-in copy verification mechanism,
290 such as a cyclic redundancy check, that could be used to prevent an inaccurate or
291 incomplete copy from Draft Guidance For Industry – Not For Implementation 12 being
292 made. A copy process that does not implement such a built-in error checking mechanism
293 to prevent making an inaccurate or incomplete copy should be validated.

294 **6. Approaches To Maintenance Of Electronic Records**

295 You should use an approach to maintenance of electronic records that is best suited to
296 your own circumstances, taking into account such factors as the
297 durability of the electronic record media and how long you are required by predicate rule
298 to maintain a particular electronic record. Below, we describe two approaches to
299 maintaining electronic records. We recognize that, within a given organization, you may
300 use one or both approaches, or another approach that meets applicable statutory and
301 regulatory requirements.

302 ***6.1 The Time Capsule Approach***

303 The electronic records time capsule approach involves preserving an electronic record on

305 the same electronic media and computer system used to create the electronic record in the
306 first place. During the records retention period the computer system might be in use or it
307 might be inactive but still be capable of working. Throughout the records retention
308 period, you would keep the computer system functional and make no changes to the
309 computing environment. For example, you would not upgrade application and operating
310 software, or hardware; upgrades would constitute a migration, an approach explained
311 below. In short, you would maintain systems as they were at the time the electronic
312 records were created.

313 Under the time capsule approach, you should preserve system documentation, and ensure
314 that personnel are proficient in system operation and routine upkeep. This means that
315 personnel who are not familiar with a maintained older system should be trained
316 accordingly.

317 This approach may be of limited practicality for long-term maintenance of electronic
318 records due to the rapid pace of technology changes, such as the emergence of new
319 storage media, revisions to application and operating software, and hardware
320 modifications. In addition, companies that originally furnished systems used to create the
321 electronic records might not elect or be able to support the systems in the long term.
322 Nonetheless, the time capsule approach might be a viable option in some instances (e.g.,
323 where record retention periods are relatively short or the electronic record is created,
324 modified, maintained, or transmitted, on a relatively low cost computing system that is
325 dedicated to creating, modifying, maintaining, or transmitting the electronic record).

326

327 **6.2 *The Electronic Records Migration Approach***

328 The electronic records migration approach involves moving electronic records
329 (migrating them) from one computing environment (the source or “old” system) to
330 another different computing environment (the destination or “new” system). You might
331 perform several successive migrations during the records retention period. The outcome
332 of the migration is an electronic record that continues to conform to
333 established regulatory and statutory requirements, including those identified above in
334 Section 4 of this document. You should document the migration so that
335 you have a traceable history of what systems were used throughout the records retention
336 period.

337 Upon completion and verification of a migration, you may elect to retire or discard the
338 old electronic records and/or system, provided that the migrated records meet all
339 requirements of the applicable predicate rules. However, you should
340 carefully consider when it would be prudent to discard the old electronic records and/or
341 system. The reason for this is that there is a risk that after the migration, a previously
342 unknown problem with the old electronic record or system might come to light. The
343 nature of the problem might adversely affect, among other things, the old electronic
344 record’s accuracy, completeness, or authenticity. Your ability to solve the problem might
345 be hampered if you no longer have the old electronic record or system. (For example,
346 solving the problem might involve installing modifications specifically intended to be
347 made to the old system software, but not intended for the new system software.)
348 During a migration, one or more of the factors that enable an electronic record to

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350 reliably preserve and present information might differ between old and new systems. For
351 example, a migration might typically involve transforming the digital sequence of
352 information (e.g., bits) that comprises the original (old) electronic record. It is important
353 to recognize differences between systems and how they might affect how reliably the
354 migrated electronic record can preserve and present information.

355 Changes in factors that affect how reliably an electronic record can preserve and present
356 information might not always be readily apparent. Examples of such changes include, but
357 are not limited to, the following:

- 358 • Installing a new version of an application or operating system software
359 program;
- 360 • Moving from one type of record storage media to a different one;
- 361 • Moving from one electronic file format to another;
- 362 • Changing from one type of video display unit or printer to another; and,
- 363 • Changing audio devices

364 6.2.1 Key Principles Of Electronic Records Migration

365 A migration generally involves a transformation of the original (old) electronic record.
366 You should be aware that without careful control, information might be lost or altered in
367 ways that impact such key factors as the electronic record's accuracy, completeness,
368 authenticity, integrity, and (potentially) confidentiality. In addition, without careful
369 control, the ability to process information might be adversely affected. We therefore

371 believe that it is extremely important that you plan and conduct the migration carefully,
372 and maintain the electronic record's ability to reliably preserve and present information.
373 Accordingly, you should carefully implement the principles set forth below in this
374 section.

375 6.2.1.1 Information Continuity Should Be Preserved.

376 We believe it is extremely important that the migrated electronic record in its new
377 computing environment conveys an accurate and complete representation of events, data,
378 actions, and identification and signatures of people as required by
379 the relevant predicate rule. Someone who reviews the migrated electronic record should
380 be able to reconstruct events to determine if the predicate rule was followed (e.g., who
381 did what, when, how, production values and conditions, study observations and findings).
382 If you do not maintain this continuity of information you might be violating the predicate
383 rule and you might not have sufficient information to detect, correct, and prevent
384 problems (e.g., problems relating to production and control of a regulated product).

385 6.2.1.2 Factors In The New Computer System That Enable The Electronic Record To
386 Reliably Preserve and Present Information Should Be Identified And
387 Controlled.

388 These factors include, but are not limited to:

- 389
- Data; we consider it extremely important that information in the migrated

391 electronic record be accurate and complete. For example, where an old
392 system electronic record included the body weights for 100 laboratory
393 animals, the migrated electronic record should contain the same information for
394 the same number of animals.

395 • Metadata; the information in the migrated electronic record that gives
396 context, meaning, and security attributes to the data should not lessen the
397 liability of the information the electronic record preserves and presents, even
398 though the metadata may have been transformed so that it functions properly in
399 the new system. For example, if a database is migrated to a new system, the new
400 data dictionary might differ from the old, but it should, nonetheless, accurately
401 and completely present the migrated information.

402 • Hardware; electronic record storage and display devices can affect the
403 reliability of information preserved and presented. For example, it is
404 possible for a new system video display that differs from the old system
405 video display in resolution or color fidelity to alter the reviewer's
406 interpretation of information (e.g., where graphics and text are color coded to
407 convey meaning and differentiate information).

408 • Software; the operating system and application programs of the new
409 system should maintain at least the same level of reliability in preserving
410 and presenting information as did the operating system and application
411 programs in the old system.

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413 6.2.1.3 Electronic Record Integrity Attributes Should Be Preserved.

414 In designing and implementing an electronic record migration you should keep in mind
415 requirements (from part 11 as well as applicable predicate rules) for preserving
416 information that establishes record integrity. Electronic record integrity information
417 might be separate from, but associated with, an electronic record, and therefore
418 inadvertently overlooked if you only focused on migrating the electronic record itself.
419 This electronic record integrity information includes, but might not be limited to, audit
420 trails and links between signatures and electronic records. For example, section 11.10(e)
421 of part 11 requires that audit trails record all operator entries and actions that create,
422 modify or delete electronic records. Where a migration, in effect, creates a new electronic
423 record (by transforming the old electronic record) then, per section 11.10(e), the audit
424 trail for the migrated electronic record would have to cover this creation. By adding this
425 new creation step to the migrated audit trail carried over from the old electronic record
426 you will help ensure a continuity of electronic record integrity.

427 An audit trail itself may undergo a transformation during a migration, but keep in mind
428 that section 11.10(e) requires that the audit trail convey certain information, including
429 information about the creation, modification, and/or deletion of the old electronic record.

430 With respect to the part 11 requirement that signatures be linked to their respective
431 electronic records, the signature to electronic record links in the new electronic record
432 system might be created by a technology that differs from that used to create the links in
433 the old system. However, to meet part 11 requirements, it is important that the new links

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435 "ensure that the signatures cannot be excised, copied, or otherwise transferred to falsify
436 an electronic record by ordinary means." (See section 11.70.) By having reliable
437 signature to electronic record links in the new computer system, you will help establish
438 continuity of electronic record integrity.

439 6.2.1.4 The Ability To Process Information In Electronic Records Should Be
440 Preserved.

441 The importance of being able to process information in an electronic record, using
442 computer technologies, is explained above. In the migration approach, the
443 new computer system should enable you to search, sort and process information in the
444 migrated electronic record at least at the same level as what you could attain in the old
445 system (even though the new system may employ different hardware and software). For
446 example, if you could sort a table of values using the old system, you should be able to
447 sort those values in the migrated electronic record using the new system, and achieve the
448 same results. Some new systems can, by emulating older systems, process information in
449 a very similar way.

450 6.2.1.5 Unavoidable Differences And Losses Should Be Accounted For and
451 Explained In The Migrated Electronic Record Or New System Documentation.

452 When electronic records are migrated from one system to another, we recognize that
453 there might be unavoidable losses or changes in certain information or record attributes
454 that do not diminish the reliability of information that is preserved and presented. It

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456 should be clear that this caveat does not apply to losses or changes in information
457 specifically mandated by predicate rules. In addition, we note that changing a record's
458 content could undermine its authenticity. Generally, our view is that the migrated
459 electronic record could still reliably preserve and present information, despite some
460 losses or modifications, provided that differences are appropriately accounted for, and
461 explained in either the migrated record or readily available electronic documentation.
462 Here are some examples:

463 • Digital signature verification: current technical methods of verifying a digital
464 signature depend upon maintaining the "as signed" electronic record in an
465 unaltered state. The automated digital signature verification process will yield a
466 “failure” outcome (indicating that the contents of the electronic record changed
467 after the record was signed, or that the signature is not genuine) if the migrated
468 electronic record is in a different file format or otherwise not identical in every
469 respect. To account for this scenario, yet ensure continuity of record integrity,
470 you should perform the following sequence of procedures:

- 471 ◆ Just prior to performing the electronic record migration a trusted
472 third party from outside of the organization that has some
473 responsibility for the electronic record verifies the digital
474 signature using the old system methods;
- 475 ◆ Under supervision of the above trusted third party, the signed
476 electronic record is migrated to the new system; and,

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- ◆ The above trusted third party then applies a new digital signature (using technologies appropriate to the new system) to the migrated electronic record. The same third party also prepares and applies a digital signature to a new separate electronic record (or to an addition to the migrated electronic record) that explains the migration. In this situation, although you would no longer be able to verify the old digital signature directly, you should nonetheless be able to demonstrate continuity of record integrity by verifying the newly digitally signed migrated electronic record and explanatory statement.

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- Color code changes; the electronic record in an old system includes a chart that uses colors to describe different groups of test animals, and the text accompanying the chart refers to the groups by those colors. The new system cannot replicate those colors; it uses a different set of colors to represent information. In this case, the migrated electronic record should use the new color representations to differentiate the groups so that the information and distinctions made in the old electronic record are maintained fully and accurately. An electronic record that supplements the migrated electronic record should explain the correlation between old and new color representations, so that the reader would correctly interpret the information. However, text (that referred to the colors) in the migrated electronic record should not be altered because doing so would change the record content and authenticity.

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501 **7. APPENDIX – References**

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503 maintenance.

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