

**Report
of the
Society of Actuaries
Underwriting Criteria Team**

(Updated to include Debit-Credit Documentation)

July 2009



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Overview of Work of Underwriting Criteria Team

The purpose of this section of the report is to document the work of the Underwriting Criteria Team (UCT). The UCT developed an algorithm used to score every risk class in a preferred risk class structure. The scoring is based on the specific underwriting criteria used by a company. The development and details of this algorithm are documented in the following pages.

There are certain abbreviations that are used throughout this section. These abbreviations are defined below:

CA = Cancer
CV = Cardiovascular disease
HDL = High-Density Lipoprotein (the good cholesterol)
POG = Project Oversight Group
SOA = Society of Actuaries
UCS = Underwriting Criteria Score
UCT = Underwriting Criteria Team

Mission

The UCT was one of the teams initially created by the Preferred Mortality Table Project Oversight Group (POG) to assist in the development of a new set of valuation basic and valuation mortality tables reflecting preferred underwriting. The UCT held its first meeting on October 27-28, 2005 and completed the bulk of its work in 2006.

The goal of the UCT was to create an algorithm to score every U.S. life insurance risk class underwritten in a preferred risk underwriting environment, from the best preferred risk class to the standard risk class. The scores are intended to allow risk classes with similarly anticipated mortality experience to be grouped together to help form the basis of analysis and development of the new preferred mortality tables. The challenge for the UCT was to be able to group classes with similar mortality expectations from different companies, even if the preferred criteria and qualifying levels between two classes were quite different.

There are two types of approaches to preferred risk underwriting structures today, a knockout (or edge) type approach and a debit/credit approach.

The algorithm was built for the knockout (or edge) type approach, which is the most common approach used today. Edge or knockout type criteria place the applicant into a higher risk class if they do not meet certain qualifying levels of all of the preferred criteria.

Companies that utilize this approach often build exceptions into their preferred underwriting guidelines. Exceptions are discussed in the next section.

The other type of preferred underwriting is called a debit/credit approach. In this approach, a specific level of each criterion is given a certain number of debits or credits and the debits and credits are added together at the end. The result of this sum indicates the placement of the individual into a particular risk class. This methodology is becoming more popular; however, it is still currently used by a minority of the companies.

An algorithm for a debit/credit type approach to preferred underwriting has not yet been designed. The final results from the knockout approach are needed to ensure consistency between the two methods. The UCT plans to create the debit/credit approach after the preferred mortality tables have been finished as there is an overlap in people involved, the development of the tables has higher priority and there could be some minor tweaks to the knockout approach during the development of the tables.

Exceptions

Exceptions are often used in a knockout (or edge) approach due to the rigidity of the approach. Exceptions allow an individual, who misses a class because of being slightly higher than allowed on one criterion, to be placed in that class anyway, as long as another criterion or two are at a certain level. Exceptions vary from company to company, but are very common in preferred underwriting today.

Some of the exceptions are “published” so the field and applicant know about them upfront and some are made known only within the underwriting department. When an exception is not published, the underwriter knows the rules and makes a final determination as to risk class based on this information. There are various reasons for choosing whether to have exceptions published, but these reasons are beyond the scope of this document.

The UCT asked companies to provide their routine exceptions, whether published or unpublished. When this information was provided, the UCT built the exceptions into the final Underwriting Criteria Score (UCS). This made the resulting score more accurate than it would have been had the exception criteria not been collected. As it may have been difficult for some companies to provide the routine exceptions, the UCT believes this should be taken into account when the algorithm is used for valuation purposes.

A couple of examples may help explain how exceptions are built into the scoring. In the first example, let's say a company has a limit on Cholesterol of 240 and a Total Cholesterol to HDL Ratio of 5.0. The company might have a routine exception that says it will automatically allow Cholesterol of up to 250 as long as the Ratio is 4.5 or better. In this case, the Ratio of 5.0 rather than 4.5 should be used in the algorithm for scoring. As you will see in the section below on Cholesterol, the UCT only scored the Ratio if a company uses both Total Cholesterol and the Ratio.

For the second example, let's assume that the build limit for a particular height is 200 pounds. Some companies may allow up to 205 pounds on an automatic exception basis if all other preferred criteria are met. In this case, 205 pounds should be used rather than the stated preferred guideline of 200 for scoring purposes in the algorithm.

Again, the UCT found when collecting the preferred underwriting criteria that few companies provided their exceptions even though they were requested. It is recommended by the UCT that companies take this into account when use the algorithm for valuation purposes.

A final note on this is that there are also ad hoc exceptions made for reasons unrelated to mortality risk assessment. These exceptions are not reflected in the scoring algorithm and will distort any comparison between the UCS and the resulting mortality experience.

Basic Structure

The UCT began by reviewing some preliminary work that had been done by the Task Force on Enhancements to Life Experience Studies for a two nonsmoker class structure. While this was helpful for determining the criteria to use and the relative importance of each of the criterion, the UCT felt that a different basic structure was needed. The previous structure gave credit for criteria that met a certain level and no credit for those criteria that did not. The UCT felt that a more continuous structure was needed. Such structure will be explained below.

The UCT discussed whether to create a different algorithm for the various number of nonsmoker classes and decided that there wasn't enough data to support such a refinement. In years to come, as more credible data becomes available, differentiating by the total number of risk classes could be considered.

After reviewing the previous work, the UCT decided on a list of the most common preferred underwriting criteria used today. There were several additions to the work that was previously done. The UCT agreed with the Task Force's prior work regarding some of the criteria being more important than others. The team determined that a three-point scale would be sufficient to differentiate the relative importance of the various criteria. Table 1 below shows the most common preferred underwriting criteria used today and their relative weight, with a weight of 3 indicating most importance and a weight of 1 indicating least importance.

Table 1 – Preferred Underwriting Criteria

<u>Criterion</u>	<u>Weight</u>
Alcohol and drug abuse	1
Blood Pressure	3
Build	2
Cholesterol	3
Family history	3
Motor Vehicle record	2
Personal history	2
Tobacco use	2
Other Factors*	1

* Aviation, avocations, citizenship, foreign travel, hazardous activities, residence

The UCT decided to score each criterion separately and then sum the results using the appropriate weight. The UCT built a basic structure for an algorithm that was continuous to account for the variations in qualifying levels and that was consistent for each of the criterion. The UCT started with a 100-point scoring system. In this structure, a score of 100 represented a borderline preferred risk, 67 represented an average preferred risk, 33 represented an average super-preferred risk and 0 represented the very best super-preferred risk. While the values at these points will certainly vary by criterion, the UCT decided to use this basic structure for all criteria.

Graphically, the structure looks like what is shown below in Chart 1.

Chart 1 – Basic Structure

Best			
Possible	Super		Borderline
Prfd	Prfd	Prfd	Prfd
1	1	1	1
0	33	67	100
Score			

The four values were set for every criterion at what was thought to be the most common value used in the industry for that particular risk class. The UCT recognized that there would likely still be values outside of these ranges, so the final structure was developed, expanding beyond the initial basic 100-point structure. The final structure is shown in Chart 2 below.

Chart 2 – Final Structure					
Minimum	Best Possible Prfd	Super Prfd	Prfd	Borderline Prfd	Maximum
1	1	1	1	1	1
?	0	33	67	100	?
Score					

The minimum value is considered to be the absolute lowest than anyone would require for their best class. The maximum was set at what the UCT believed was the highest level that the insurance on a life would be issued standard, which was approximated at a level of a substandard Table 3 rating.

The reason for the question marks under the minimum and maximum values is that the scores for the minimum and maximum were derived for each criterion. For the minimum score, the slope between the 0 and 33 values was applied to the difference between the 0 value and the Minimum value. For the maximum score, two times the slope between the 67 and 100 values was applied to the difference between the 100 value and the Maximum value. The reason for this different treatment is the UCT felt more should be taken away from a criterion that was worse than what was considered standard than should be given for an extremely tough-to-meet criterion value. The UCT decided that the two-to-one ratio was appropriate. In a several instances, the UCT either set a maximum score or averaged the derived maximum scores. This was done to simplify the calculations and will be pointed out in the documentation below when utilized.

Any values below the minimum or above the maximum are to be treated as being at the minimum or maximum, respectively.

Like the four values under the original structure, the Minimum and Maximum values were set at what was felt to be the most common levels in the industry. The UCT utilized preferred criteria in reviewing the results, as well as the most recent Preferred Underwriting Survey published by the SOA.

An example may help in understanding how the minimum and maximum scores are determined. Chart 3 below shows the results for the Total Cholesterol to HDL Ratio.

Chart 3 – Total Cholesterol to HDL Ratio

2.5	3.5	4.5	5.5	7.0	9.0
1	1	1	1	1	1
-33	0	33	67	100	188
Score					

The minimum score of -33 is derived as: $0 - (3.5 - 2.5) / (4.5 - 3.5) \times (33 - 0) = -33$. The maximum score of 188 is derived as: $100 + (9.0 - 7.0) / (7.0 - 5.5) \times (100 - 67) \times 2 = 188$.

To determine a score for an intermediate value of the criterion, the UCT used linear interpolation between the scores on either side of the given value. So, using the Total to HDL Cholesterol Ratio example in Chart 3 above, if a company uses a Ratio of 5.0, they would receive a score of 50. This is derived as: $67 - (5.5 - 5.0) / (5.5 - 4.5) \times (67 - 33) = 50$. It could also be derived as $33 + (5.0 - 4.5) / (5.5 - 4.5) \times (67 - 33) = 50$.

Detailed Results

This subsection will outline the scoring for each of the individual criterion and any special considerations that went into the scoring. At the end of the subsection, we will show how all of the individual results are brought together.

Alcohol and Drug Abuse (Weight of 1)

This criterion looks at the personal history of alcohol and/or drug use and abuse. Most companies are concerned with how long it has been since alcohol and/or drugs were abused. So, for this criterion, the UCT sought to capture whether alcohol and/or drug abuse was asked about and, if so, the length of time required for the applicant to be abuse free.

The UCT used the scoring structure shown in Table 2 below for alcohol and drug abuse separately and averaged the results.

Table 2 – Alcohol and Drug Abuse Scoring

Score	Description
0	No alcohol or drug abuse in the last 20 years
33	“ 10 years
67	“ 7 years
100	“ 5 years
120	“ 1 year
133	“ Not asked about

As described above, 33 represents the most common Super-Preferred value and 67 represents the most common Preferred value. The UCT chose 133 as the upper bound, rather than using the formula, because the UCT felt it better reflected the appropriate level for this criterion. Note that when either alcohol or drug abuse were not asked about in the company criterion, the score would be calculated by averaging the score from the one that was asked about, using the scoring in Table 2 above, with 133 (the maximum score that is used when one of the criterion is not asked about by the company).

Blood Pressure (Weight of 3)

The key components of the blood pressure criterion are the systolic and diastolic readings, whether or not the readings are based on an individual treated for hypertension, and the age of the individual. The UCT did not consider whether the reading was a single reading or an average of readings in our algorithm.

The UCT, through some outside research, decided that the diastolic readings would be valued with twice the weight as the systolic values. If the company specific criterion accepts individuals treated for hypertension, the UCT decided to add 2.5 to the company’s diastolic blood pressure limit value and 5 to the company’s systolic blood pressure limit value prior to the score. With respect to age, we created a scoring scale for ages 45 and 65 and assigned the resulting scores equal weight.

To determine the blood pressure score, the UCT decided to use the values and weights shown in Table 3 below. The maximum scores were averaged and the average was used as the maximum score for each systolic and diastolic reading to make the calculation simpler.

Table 3 – Blood Pressure Scoring

Age 45				Age 65			
Score	Systolic	Score	Diastolic	Score	Systolic	Score	Diastolic
-33	120	-19.8	72	-33	120	-30	77
0	125	0	75	0	125	0	80
33	130	33	80	33	130	33	83.3
67	140	67	85	67	140	67	86.7
100	150	100	90	100	150	100	90
127	152	127	92	127	152	127	92
Weight	1/6		2/6		1/6		2/6

Build (Weight of 2)

With build, the UCT decided to look at several places in the build chart for both males and females to get a better reading on what a particular company was doing. For males, the UCT chose to look at 5'6", 5'10" and 6'2". For females, the UCT chose to look at 5'2", 5'6" and 5'10". The UCT assumed equal weightings among each of the heights for both males and females; however, the UCT assumed a 65/35 split for males/females as the approximate industry average. This is an area that could be modified in the future, allowing a company to input their actual split between males and females.

Tables 4 and 5 below show the scoring of the male and female build values, respectively. Again, the maximum scores were averaged and the average was used as the maximum score was used for each height/weight combination to make the calculation simpler.

Table 4 – Build (Male Height/Weight) Scoring

		<u>5'6"</u>		<u>5'10"</u>		<u>6'2"</u>	
<u>Score</u>	<u>Weight</u>	<u>Score</u>	<u>Weight</u>	<u>Score</u>	<u>Weight</u>	<u>Score</u>	<u>Weight</u>
-33	155	-33	175	-33	195	-33	195
0	165	0	185	0	205	0	205
33	175	33	195	33	215	33	215
67	185	67	210	67	230	67	230
100	195	100	220	100	245	100	245
166	205	166	225	166	250	166	250
Weight 22%		22%		22%		22%	

Table 5 – Build (Female Height/Weight) Scoring

		<u>5'2"</u>		<u>5'6"</u>		<u>5'10"</u>	
<u>Score</u>	<u>Weight</u>	<u>Score</u>	<u>Weight</u>	<u>Score</u>	<u>Weight</u>	<u>Score</u>	<u>Weight</u>
-22	120	-13.2	130	-16.5	150	-16.5	150
0	130	0	140	0	160	0	160
33	145	33	165	33	180	33	180
67	155	67	175	67	195	67	195
100	170	100	185	100	210	100	210
166	180	166	200	166	225	166	225
Weight 12%		12%		12%		12%	

For the astute reader, 3x22% + 3x12% doesn't add up to 100%. The weights of 12% and 22% are rounded percentages and the correct actual percentages are used in the calculation.

The UCT also put together parameters for BMI for those companies that use BMI. The scoring is shown in Table 6 below for both males and females.

Table 6 – Build (Male and Female BMI) Scoring

<u>Score</u>	<u>BMI</u>
-66	21
0	25
33	27
67	29
100	31
166	33

Cholesterol (Weight of 3)

While cholesterol is a common preferred underwriting criterion, some companies use Total Cholesterol, some use the Total to HDL Cholesterol Ratio and still others use both of these measures in their preferred underwriting guidelines. The UCT believes the Ratio to be the better measure. Therefore, scoring is based on the Ratio if it was used, whether or not Total Cholesterol was also used in the individual company criterion. If only Total Cholesterol was used, without use of the Ratio, the scoring is based on Table 8 below; however, an adjustment is made to reach a final Cholesterol score. The adjustment is to weight the score derived from Table 8 by 75% and the maximum value of 188 by 25% to derive the final score when only Total Cholesterol was used.

Another consideration for cholesterol is whether the individual company criterion allows for treated cholesterol. If it does, the following adjustments are applied. When using the Ratio, 0.5 is added to the company’s Total to HDL Cholesterol Ratio limit value prior to the scoring. When using Total Cholesterol where treatment is allowed, the company’s Total Cholesterol limit value is increased by 10 prior to the scoring.

Scoring of the Total Cholesterol to HDL Ratio is shown below in Table 7 and scoring of Total Cholesterol is shown below in Table 8.

Table 7 – Total Cholesterol to HDL Scoring

<u>Score</u>	<u>Ratio</u>
-33	2.5
0	3.5
33	4.5
67	5.5
100	7.0
188	9.0

Table 8 – Total Cholesterol Scoring

<u>Score</u>	<u>TC</u>
-82.5	150
0	200
33	220
67	250
100	280
188	320

Family History (Weight of 3)

There are five key components to the family history criterion. These are shown in Table 9 below along with their corresponding relative weight.

Table 9 – Family History Components

<u>Component</u>	<u>Weight</u>
The number of incidences allowed	2
Whether the incidences are based on parents or both parents and siblings	1
The specific age before which the incidences must occur to be considered	2
Whether family history is based on death from or diagnosis of a particular disease	2
The type and number of diseases considered	1

In Table 10, the UCT chose to use two-point weights on three categories to emphasize their importance over the other two categories.

For several of these components, there are very limited choices (e.g., the criterion is based on either just the parents or both the parents and siblings). With these limited choices, if one choice was common for the Preferred and Super-Preferred risk classes, for example, it would receive a score of 50, which is the average of the Preferred (67) and Super-Preferred (33) classes.

Scoring for family history is shown below in Tables 10-16.

Table 10 – Family History (Number of Incidences) Scoring

<u>Score</u>	<u>Number of Incidences</u>
33	0
100	1
133	2

Weight 2/8

Table 11 – Family History (Parents / Siblings) Scoring

<u>Score</u>	<u>Parents / Siblings</u>
-17	Parents and Siblings
67	Parents only

Weight 1/8

Table 12 – Family History (Age) Scoring

<u>Score</u>	<u>Age</u>
-33	70
0	65
50	60
100	55
133	50

Weight 2/8

Table 13 – Family History (Death / Diagnosis) Scoring

<u>Score</u>	<u>Death / Diagnosis</u>
0	Diagnosis
100	Death

Weight 2/8

Table 14 – Family History (Type and Number of Diseases) Scoring

<u>Score</u>	<u>Number of Diseases</u>
50	Both Cardiovascular and Cancer included
117	Only one of Cardiovascular or Cancer included

Weight 1/8

At this point, the Family History UCS is determined using the results from Tables 10-14.

A further adjustment is made when diseases in addition to Cardiovascular (CV) and Cancer (CA) are also included. The approach used here is different from that used in the rest of the scoring because this component was refined at a later stage and could not be incorporated into the general structure. If additional diseases are included, a further adjustment is made to the total Family History UCS already calculated. This adjustment is shown in Table 15 below.

Table 15 – Family History (Adjustment to Type and Number of Disease Scoring)

<u>Adjustment</u>	<u>Description</u>
-8	Diabetes included
-5	One disease included (other than CV, CA and Diabetes)
-9	Two or more diseases included (other than CV, CA and Diabetes)

To demonstrate how the Type and Number of Diseases scoring works, let's assume that a particular company's preferred family history criterion does not allow death of a parent prior to a certain age for deaths related to cancer or diabetes. The score would be $117 - 8 = 109$. If death due to cardiovascular disease was also included, the score would be $50 - 8 = 42$. If the criterion included death due to cancer and respiratory disease, the score would be $117 - 5 = 112$. And, finally, if the criterion included death due to cancer, cardiovascular disease, diabetes, respiratory disease and gastrointestinal disease, the score would be $50 - 8 - 9 = 33$.

Now let's look at the full family history scoring process. A typical family history criterion may read something like "No incidences of death due to cardiovascular disease or cancer in parents before age 65." Table 16 below shows how this sample criterion would be scored.

Table 16 – Scoring of Family History Example

<u>Component</u>	<u>Score</u>	<u>Weight</u>		<u>Weighted Score (Score x Weight)</u>
Number of Incidences	33	x 2	=	66
Parents / Siblings	67	x 1	=	67
Age	0	x 2	=	0
Death / Diagnosis	100	x 2	=	200
Number of Diseases	50	x 1	=	<u>50</u>
Sum of Weighted Scores				383
Sum of Weights				<u>8</u>
Final Score (Sum of Weighted Scores / Sum of Weights)				47.9

Motor Vehicle Record (Weight of 2)

Motor vehicle records vary state to state; however, there are several critical components which are publicly available from most states that are used in our scoring of driving record. Those components are moving violations, driving while under the influence of alcohol or drugs (DUI, DWI, etc.) and reckless driving.

For moving violations and DUIs, the scoring is based on both the number allowed and the period of time over which they are allowed. A typical moving violation criterion may read “no more than 3 moving violations in 2 years.” A typical DUI criterion may read “no DUIs in the last 5 years.” The scoring developed by the UCT is based on these types of statements.

The UCT felt that DUIs were twice as important as moving violations, so we apply a 1/3 weight to the score derived for moving violations and a 2/3 weight to the score derived for DUIs.

If reckless driving was used in the criterion, we decreased the final score by 17.

The scoring for moving violations is shown in Table 17 below. Table 17 shows some extremely high values and this was done to round out the table; however, the UCT does not expect any companies’ criterion to be at these higher levels. The maximum score to be used for the driving record criterion in the overall calculation is 150.

Table 17 – Moving Violation Scoring

Number of Years	Number of Violations				
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
1	50	100	400	1000	2000
2	33	67	100	400	1000
3	0	33	67	100	400
4	-17	0	33	80	200
5	-33	-17	17	67	150

Table 18 below shows the scoring for DUIs. Like moving violations, the UCT does not expect companies to have risk classes that receive the highest scores shown in Table 18.

Table 18 – DUI Scoring

Number of Years	Number of DUIs	
	<u>0</u>	<u>1</u>
1	250	600
2	150	400
3	100	300
4	75	150
5	50	100
6	25	83
7	0	50
8	-10	20
9	-20	0
10	-30	-17
Ever	-30	-17

Personal History (Weight of 2)

The personal medical history criteria amongst companies are quite varied. The basic components that the UCT felt were important regarding personal history were whether impairments are allowed, whether substandard flat extras are allowed and how many diseases were specifically excluded.

The UCT tried to simplify the various things that are being asked for in the scoring structure. Scoring for the personal history criterion is shown below in Tables 19 and 20.

Table 19 – Personal History (Number of Diseases) Scoring

<u>Score</u>	<u>Number of diseases recognized</u>
33	3
67	2
100	1
120	0

Table 20 – Personal History (Use of Non-medical Flat Extras) Scoring

<u>Adjustment</u>	<u>Description</u>
+20	If non-medical flat extras are used

For purposes of this algorithm, the UCT has assumed that individuals scoring as substandard do not qualify for a preferred rating. Therefore, a statement such as “No substandard risks are allowed” should not be given any value in this rating system. A maximum score of 140 would be given to those who do not utilize this criterion.

Tobacco Use (Weight of 2)

For the tobacco criterion, the UCT based the scoring on two factors, whether the smoking definition was based on cigarettes or tobacco, and the number of years the person had to have not smoked. These two components are scored separately and the scores are added together to get the final tobacco criterion score. The scoring for the definition is shown below in Table 21 and the scoring for the number of years is shown below in Table 22. This criterion is only used for the non-tobacco classes since it affects individuals who recently ceased smoking and qualify for a non-tobacco class and has minimal impact on the mortality of individuals in the tobacco classes.

Table 21 – Tobacco (Definition) Scoring

<u>Score</u>	<u>Definition</u>
0	Tobacco
48	Cigarettes

Table 22 – Tobacco (Number of Years Since Last Smoked / Used Tobacco) Scoring

<u>Score</u>	<u>Years</u>
0	10
33	5
67	2
100	1

Other Factors - Aviation, Avocations, Citizenship, Foreign Travel, Hazardous Activities, Residence (Weight of 1)

For the “Other” criterion, the UCT simply counts how many of the other items (aviation, avocations, citizenship, foreign travel, hazardous activities and residence) are used in the preferred underwriting guidelines. However, if the guideline simply says “no ratable _____,” then the UCT does not count it because it provides no more protection than not saying anything at all. For purposes of this algorithm, the UCT has assumed that individuals scoring as substandard do not qualify for a preferred rating.

Once the number of “other” items is determined, the scoring for this criterion follows Table 23 below.

Table 23 – Other Factors Scoring

<u>Score</u>	<u>Number of Items Used</u>
0	6
23	5
45	4
67	3
89	2
111	1
133	0

Bringing the Results Together

Once each individual criterion is scored, the scores are multiplied by their respective weights. The weighted scores are added together and this total is divided by 19 (the sum of the weights) for non-tobacco users and 17 (the sum of the weights) for tobacco users. The resulting number (rounded to one decimal point) is the score for this particular risk class.

This procedure should be repeated for all risk classes (except the residual standard class), first within the specific product, then for each product and, finally, historically by issue date if the preferred underwriting criteria have changed over time (during the study period). Note that if two products share identical criteria, it is not necessary to go through this process with both products. For valuation purposes, products and/or classes with similar scores could be grouped together; however, the first time through this process, it is recommended that every non-unique class be scored individually.

The residual standard classes are not scored, but rather set at 148. This score has been calculated assuming the worst possible results for each of the criterion and then weighting the criterion by the weights provided. The UCT felt this was a reasonable approach because most companies do not have restrictions on the residual class other than not having a substandard rating. It was also a practical necessity because the criteria used to determine whether a life is standard or substandard is required to evaluate that limit. This information was not available to the UCT.

Some companies actually have specific criteria for their residual standard class. In cases where the criteria for this class are ignored, this class should be considered the residual standard class and be scored as described in the preceding paragraph. On the other hand, if the criteria for this class are actually used, the company should score this class as described in this report and consider it another class in their preferred class structure. The remaining “standard” risks which did not qualify for this “last” class would form another class, the residual standard class, and this new class would be scored as described in the preceding paragraph.

Company Scoring

Each company has a unique set of criteria used to determine whether an applicant qualifies for preferred. These criteria vary by risk class and also often by plan. They have also varied historically.

A request was made to all companies contributing mortality data to the 2002-04 SOA data call to provide the preferred underwriting criteria for all classes and all plans, historically, since they began writing preferred. The UCT scored all of the criteria received and then matched it back to the mortality data file submitted by each company to the SOA on an individual record basis. In this call for mortality data, the company was

requested to provide, for every individual record, the specific risk class associated with that record and the total number of risk classes associated with that plan.

A number of discrepancies were found in the submitted data and the UCT set out to reconcile these differences. Some discrepancies were able to be resolved; however, clarification from the company was often necessary. Sometimes the mortality data record was wrong and sometimes the preferred criterion was wrong. Each of the discrepancies was reconciled. Changes to the preferred underwriting criteria were made where appropriate and the UCT provided the corrections for the mortality database in a file to MIB, who is the mortality data handler. The UCT understands that the records containing discrepancies were deleted from the database, rather than being fixed, due to cost considerations.

All of the scoring for individual companies was done in an Excel spreadsheet and is stored at the Society of Actuaries for use in future studies. The spreadsheets were designed so new criteria could easily be added in order to keep historical records for each company. The companies were coded with a 3-digit letter/number combination to keep the identity of the specific companies confidential from the volunteers working with the data. Only the SOA and MIB have the company code key.

Validation of the Algorithm

The specific qualifying levels used as most common for the Super-Preferred, Preferred, etc. levels were generally based on the knowledge and expertise of the actuaries and underwriters on the UCT. Some further research was done on a few parameters. Also, some of the more difficult decisions went through a fair amount of discussion and debate before a conclusion was reached. While the UCT is comfortable with these decisions, they are just educated opinions with which other industry experts can agree or disagree.

Minimal testing was done by the UCT after the algorithm was completed. Most of the testing of the UCS that was done was completed by the Experience Analysis Team. In general, we found that for each specific company/product, the algorithm produced scores in the order of magnitude that the UCT would have expected (i.e., the Super-Preferred risk class had a lower score than the Preferred risk class, which had a lower score than the Standard risk class). However, when the UCT looked at the mortality resulting from like scores, there was some variation. This could be due to a lack of credibility in some of the data, but also a number of things which the algorithm does not take into account, including, but not limited to:

- Exceptions to these criteria
- Target market
- Distribution channel
- Underlying product

Therefore, caution is advised in the use of the UCS as the exclusive indicator of preferred mortality risk. For valuation purposes, the UCT recommends providing a method to allow for some of these potential differences. While the UCT believes that the UCS gives a good general indication of the table to use, it is not the absolute answer for the reasons explained above.

Further detailed analysis of the UCS is included in the Experience Analysis Team report.

How the UCS is used in the development of the new preferred mortality tables is explained in the Valuation Basic Table Team report. The UCT recommends that the score be required to be included in the actuarial memorandum for all preferred risk class programs so the appropriate valuation table to use can more readily be determined.

Note that the UCT intends to create an algorithm for a debit/credit approach to preferred underwriting in 2008.

Additional Thoughts

This section contains some additional thoughts not covered elsewhere in the report.

Some items may be difficult to score as there could be different interpretations of what is being requested as input. The UCT recommends having some ability to email questions so they can be answered on a timely basis. This will be particularly critical towards year-end if the scoring process is needed to determine the appropriate valuation table to use. Likewise, as certain items may be difficult to score, the UCT recommends that a review process be put in place to make sure companies have interpreted their criteria, as it relates to the algorithm, correctly.

The UCT found it surprising that there were not more lower (i.e., Super-Preferred level) scores. It is certainly possible that our estimate of the most common Super-Preferred levels for some of the criteria could have been off. The UCT recommends that this be looked into the next time this algorithm is reviewed.

It is also recommended that, in the future, as additional preferred criteria are collected from participating companies, this be reviewed for possible enhancements to what is considered most common. Preferred underwriting criteria and qualifying levels will likely continue to evolve over time.

The UCT recommends that a repository be set up for suggested enhancements that can be referred to the next time a group meets to review the algorithm. Our recommendation is that the algorithm be reviewed at least once every five years and that it be reviewed every time a new valuation table is to be introduced (assuming that the intent is to continue to use the algorithm).

The UCT believes that someone should be responsible for watching emerging trends in preferred underwriting. If new criteria become common, they should be incorporated into the algorithm on a timely basis.

Another possible area for enhancement to future versions of the algorithm could be in the differentiation of criteria by age. Currently, we simply average the results of a high and low age for Cholesterol and Blood Pressure levels. This could certainly be enhanced by including criterion levels at additional ages or by developing a full UCS for various ages and then basing the overall score on the individual company's distribution of business. There are many variations that could be considered in the future.

Some thought should be given to any future revisions to the algorithm. While enhancements can and probably should be made over time, how will they be handled from a historical perspective? Can a future change impact a past evaluation and appropriate valuation table? What is the historical impact? Would this original version continue to be used for 2007 or 2008 issues and earlier or be scrapped in favor of any new version? Will changing the relative weight of the values improve the predictive capability of the algorithm? These are just some of the questions that should be addressed as a part of any future reviews of the algorithm. Who will be responsible for future review and enhancements? Who will keep track of these changes?

And finally, there are several items to consider for publication and use of the algorithm. How will the algorithm be published? The UCT recommends that it be secure so the algorithm can't be changed by the user. It is also recommended that a version number (or effective date) automatically be stamped in some way on all output so everyone will know if the most recent version was used. The UCT also recommends that users be directed to a central site to use the algorithm rather than be able to copy it remotely to ensure that the latest version is always used. The UCT recommends that it be stored on only one site so that maintenance and updates are easier. The most likely sites would be the SOA or the Academy, the sponsors of this work.

Appendix A

Debit-Credit Documentation

Members of the Debit-Credit Team

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INTRODUCTION TO DEBIT-CREDIT SYSTEMS

A debit-credit (D/C) preferred risk classification system is a point based system. Points are assigned if an applicant achieves a certain value or possibly multiple values for a particular risk factor/criterion (i.e. build, blood pressure, cholesterol, etc.). Points are assigned for each criterion used in this system, and can be expressed as either positive or negative values. The total of the points achieved by an applicant determines the risk class to which that applicant is assigned. Depending on the specific system, lower or higher point totals can be associated with the lower mortality risk.

Each risk class is assigned a point value threshold by the insurance company. The sum of the points awarded to a particular applicant for each criterion is compared to the various risk class thresholds to determine the risk class for that applicant.

D/C systems can also include some risk factors that are applied using a knockout (K/O) approach. For example, a personal history of cancer might automatically disqualify an applicant from any preferred risk class.

The structure of preferred risk programs (including those with a D/C structure) can vary widely from company to company and sometimes even from product to product within the same company.

To simplify the rest of this document, we will illustrate a D/C system where lower point totals are associated with risks having lower expected mortality.

INCORPORATING DEBIT/CREDIT SYSTEMS INTO THE CURRENT UCS TOOL

The initial version of the Underwriting Criteria tool was created for knockout systems only. The revised version of the tool adds the functionality to calculate the Underwriting Criteria Score (UCS) for D/C systems and D/C-K/O hybrid systems.

DEFINITION OF UNDERWRITING CRITERIA SCORE AND RELATIVE RISK RATIO

In a Principles Based Reserve (PBR) environment, the appropriate valuation table needs to be determined for the reserving of individual preferred classes when a company has less than fully credible experience. This is done through a multi-step process. First, a UCS is determined for each risk class. The UCS is designed to group risk classes together based on the strength (or weakness) of the preferred underwriting criteria used in a preferred risk program. Lower expected mortality is associated with a lower UCS. The UCS is then converted to a Relative Risk Ratio (RRR). The RRR helps to determine the specific valuation table a company should use. The UCS tool mentioned above, and

described in more detail below, helps a company determine the UCS for each risk class used in the preferred risk program.

The UCS and RRR are calculated consistently for all types of preferred risk program structures. As with the initial version, separate values are calculated for smoker and non-smoker risk class structures.

UCS TO RRR CONVERSION TABLE

The *UCS to RRR Conversion Table*, included in Appendix D of the “2008 VBT Report” provides the relationship between the UCS, the RRR and the expected corresponding proportion of business written.

The *Conversion Table* is used to determine the RRR and the proportion of the insurable population theoretically qualifying for a risk class based on the calculated UCS. The term “cumulative” is used in this table. The “cumulative proportion” associated to a particular UCS is the percentage of the population that will qualify for that risk class and all better (lower) risk classes. Likewise, the corresponding “cumulative RRR” defines the relative mortality for risks in that class and all better risk classes.

The UCS to RRR/Proportion relationships for risk classes based on a K/O structure are calculated based on the combined effect of all risk criteria. For D/C and hybrid structures, the calculation underlying the *Conversion Table* needs to be expanded to provide a separate set of values for each criterion. It was decided to do this by creating a one-to-one correspondence between the range of UCSs for each criterion and the range of UCSs from the *Conversion Table*. Table 1 below shows an excerpt from this table plus several extra columns needed for the calculation example shown below. The values shown are only those that are required for the specific example developed in this paper. The full “Expanded Conversion Table” is provided in Appendix A of this report. Note that the first three shaded columns (UCS, Cumulative RRR and Cumulative Proportion) are obtained directly from the original *Conversion Table*. As each individual criterion has its own minimum and maximum UCS, the relationship for the overall risk class was applied to each individual criterion to create the UCS values shown in this table. The last column, “D/C Criteria Combined”, is the weighted average of only the criteria in this example which use the D/C logic. This column is calculated based on the criteria of each individual program which use D/C logic in its risk qualification requirements.

Table 1
Excerpt from Expanded UCS to RRR Conversion Table
(Complete table is provided in Appendix A)

Overall Table			Individual Criteria									D/C Criteria Combined
UCS	Cumulative		Alcohol / Drug Abuse	Blood Pressure	Build	Chol	Family History	Motor Vehicle Report	Personal Medical	Tobacco Definition	Misc.	Calculated based on program
	RRR	Proportion	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS
...												
73	80.15	53.719%	74.7	56.8	78.7	91.1	60.2	69.7	74.7	83.1	74.7	75.14
74	80.64	55.240%	75.4	57.8	79.9	92.4	61.2	70.8	75.4	84.0	75.4	76.27
...												
87	86.34	72.934%	85.6	69.9	95.0	109.2	73.8	84.7	85.6	95.2	85.6	90.91
88	86.72	74.081%	86.3	70.9	96.2	110.5	74.8	85.8	86.3	96.1	86.3	92.04
...												
148	100.00	100.000%	133.00	127.00	166.00	188.00	133.00	150.00	133.00	148.00	133.00	159.63

OVERVIEW OF D/C SPREADSHEET CALCULATIONS

There are several steps to the process of determining an appropriate UCS for a D/C structure. We need to determine UCSs for:

- Each point value range within each criterion
- Each risk class - by combining all possible combinations of point value ranges for all criteria
- Each criterion within each risk class

The calculations involved in each of these steps, along with an example, are provided below.

For each criterion used in a D/C structure, the company inputs the value of the edge of each range and the points awarded for each range. The ranges for our example are shown in *italics*. This defines our hypothetical company's point structure for each criterion. In the example, a total cholesterol level up to 199 would receive -2 points, while a level of 240-260 would be given +3 points. A value of 261 or higher indicates the risk does not qualify for the super preferred or preferred risk criteria of the example in this paper. This life would only qualify for a risk class with worse mortality than these super preferred and preferred risk classes. Each criterion can have multiple ranges of points. Tables 2a, 2b and 2c show an illustrative point structure using three criteria: Total Cholesterol, Body Mass Index and Blood Pressure.

The Cumulative columns show the prevalence and UCS for each set of range values and all lower ranges. These values are determined by looking up the upper bound of the range in Appendix D of the 2008 VBT report. The Category columns show the

prevalence and UCS values for that range only. These values are also derived from Appendix D of the 2008 VBT report. The Category values are carried over into the “All Combinations Grid” shown in Table 4.

Table 2a– Total Cholesterol (Weight = 3)						
Sample Debit-Credit Scoring System Using 3 Risk Criteria						
Treated Cholesterol not allowed						
			Cumulative		Category	
Cat.	Range Values	Points	Prevalence	UCS	Prevalence	UCS
1	to 199	-2	12.9%	45.8	12.9%	45.8
2	200-239	0	26.8	65.9	13.9	84.7
3	240-260	3	45.9	83.5	19.1	108.2

Table 2b – Build (Body Mass Index, Weight = 2)						
Sample Debit-Credit Scoring System Using 3 Risk Criteria						
Treated Blood Pressure not allowed						
			Cumulative		Category	
Cat.	Range Values	Points	Prevalence	UCS	Prevalence	UCS
1	-25.0	-2	1.0%	0	1.0%	0.0
2	25.1-27.0	1	10.7	33	9.7	36.5
3	27.1-29.0	4	37.4	67	26.7	80.6
4	29.1-31.0	8	78.0	100	40.6	130.4

Table 2c – Blood Pressure (Systolic/Diastolic, Weight = 3)						
Sample Debit-Credit Scoring System Using 3 Risk Criteria						
Treated Blood Pressure not allowed						
			Cumulative		Category	
Cat.	Range Values	Points	Prevalence	UCS	Prevalence	UCS
1	to 129/80	-3	10.9%	19.8	10.9%	19.8
2	to 135/85	2	51.0	55.7	40.2	65.4
3	to 145/90	8	92.9	94.5	41.9	141.8

Each company will provide the total point threshold required to qualify for each risk class. In this example, a non-tobacco individual with a total of 10 points or less would be classified as a Super-preferred risk while someone with 11-20 points would be a Preferred risk, as shown in Table 3. Anyone with 21+ points would be a Standard risk.

Table 3			
Sample Debit-Credit Risk Class Definition Based on Points			
Preferred Class No.	Relative Risk Profile	Class Name	Qualifying Total Points
1	Lowest risk	<i>Super preferred NT</i>	<i>Up to 10</i>
2	Next lowest risk	<i>Preferred NT</i>	<i>11 - 20</i>

COMBINING CRITERION UCSs AND PROPORTIONS

In this example, two of the criteria (Total Cholesterol and Blood Pressure) have 3 different point value ranges. The third (Build) has 4 different point value ranges. Therefore, there are 36 (3 x 3 x 4) different point value ranges. Every possible combination of these point value ranges must be evaluated to determine the overall UCS for this structure. This is done by summing the weighted proportion of all possible combinations. The criterion weights are the same as those used in the K/O algorithm. This overall UCS in combination with the total point thresholds then determines the risk class for which an individual applicant qualifies. Table 4 shows an extract of this calculation for our example.

Table 4
“All Combinations Grid”

Cholesterol (weight = 3)				Build (weight = 2)				Blood Pressure (weight = 3)				Overall (weight = 8)			
Cat.	Points	Cat. UCS	Cat. Prop.	Cat.	Points	Cat. UCS	Cat. Prop.	Cat.	Points	Cat. UCS	Cat. Prop.	Sum of Points	Wtd Avg Cat. UCS	Prop.	Pref Class No.
1	-2.0	46	12.9%	1	-2.0	0	1.0%	1	-3.0	20	10.9%	-7.0	24.59	0.0%	1
2	0.0	85	13.8%	1	-2.0	0	1.0%	1	-3.0	20	10.9%	-5.0	39.20	0.0%	1
3	3.0	108	19.1%	1	-2.0	0	1.0%	1	-3.0	20	10.9%	-2.0	48.00	0.0%	1
1	-2.0	46	12.9%	2	1.0	36	9.7%	1	-3.0	20	10.9%	-4.0	33.70	0.1%	1
2	0.0	85	13.8%	2	1.0	36	9.7%	1	-3.0	20	10.9%	-2.0	48.32	0.1%	1
3	3.0	108	19.1%	2	1.0	36	9.7%	1	-3.0	20	10.9%	1.0	57.12	0.2%	1
1	-2.0	46	12.9%	3	4.0	81	26.7%	1	-3.0	20	10.9%	-1.0	44.75	0.4%	1
2	0.0	85	13.8%	3	4.0	81	26.7%	1	-3.0	20	10.9%	1.0	59.36	0.4%	1
3	3.0	108	19.1%	3	4.0	81	26.7%	1	-3.0	20	10.9%	4.0	68.17	0.6%	1
1	-2.0	46	12.9%	4	8.0	130	40.6%	1	-3.0	20	10.9%	3.0	57.18	0.6%	1
2	0.0	85	13.8%	4	8.0	130	40.6%	1	-3.0	20	10.9%	5.0	71.80	0.6%	1
3	3.0	108	19.1%	4	8.0	130	40.6%	1	-3.0	20	10.9%	8.0	80.60	0.8%	1
1	-2.0	46	12.9%	1	-2.0	0	1.0%	2	2.0	65	40.2%	-2.0	41.68	0.1%	1
2	0.0	85	13.8%	1	-2.0	0	1.0%	2	2.0	65	40.2%	0.0	56.30	0.1%	1
3	3.0	108	19.1%	1	-2.0	0	1.0%	2	2.0	65	40.2%	3.0	65.10	0.1%	1
1	-2.0	46	12.9%	2	1.0	36	9.7%	2	2.0	65	40.2%	1.0	50.79	0.5%	1
2	0.0	85	13.8%	2	1.0	36	9.7%	2	2.0	65	40.2%	3.0	65.41	0.5%	1
3	3.0	108	19.1%	2	1.0	36	9.7%	2	2.0	65	40.2%	6.0	74.21	0.7%	1
1	-2.0	46	12.9%	3	4.0	81	26.7%	2	2.0	65	40.2%	4.0	61.84	1.4%	1
2	0.0	85	13.8%	3	4.0	81	26.7%	2	2.0	65	40.2%	6.0	76.46	1.5%	1
3	3.0	108	19.1%	3	4.0	81	26.7%	2	2.0	65	40.2%	9.0	85.26	2.0%	1
1	-2.0	46	12.9%	4	8.0	130	40.6%	2	2.0	65	40.2%	8.0	74.27	2.1%	1
2	0.0	85	13.8%	4	8.0	130	40.6%	2	2.0	65	40.2%	10.0	88.89	2.3%	1
3	3.0	108	19.1%	4	8.0	130	40.6%	2	2.0	65	40.2%	13.0	97.69	3.1%	2
1	-2.0	46	12.9%	1	-2.0	0	1.0%	3	8.0	142	41.9%	4.0	70.35	0.1%	1
2	0.0	85	13.8%	1	-2.0	0	1.0%	3	8.0	142	41.9%	6.0	84.97	0.1%	1
3	3.0	108	19.1%	1	-2.0	0	1.0%	3	8.0	142	41.9%	9.0	93.77	0.1%	1
1	-2.0	46	12.9%	2	1.0	36	9.7%	3	8.0	142	41.9%	7.0	79.47	0.5%	1
2	0.0	85	13.8%	2	1.0	36	9.7%	3	8.0	142	41.9%	9.0	94.08	0.6%	1
3	3.0	108	19.1%	2	1.0	36	9.7%	3	8.0	142	41.9%	12.0	102.88	0.8%	2
1	-2.0	46	12.9%	3	4.0	81	26.7%	3	8.0	142	41.9%	10.0	90.51	1.4%	1
2	0.0	85	13.8%	3	4.0	81	26.7%	3	8.0	142	41.9%	12.0	105.13	1.5%	2
3	3.0	108	19.1%	3	4.0	81	26.7%	3	8.0	142	41.9%	15.0	113.93	2.1%	2
1	-2.0	46	12.9%	4	8.0	130	40.6%	3	8.0	142	41.9%	14.0	102.95	2.2%	2
2	0.0	85	13.8%	4	8.0	130	40.6%	3	8.0	142	41.9%	16.0	117.56	2.4%	2
3	3.0	108	19.1%	4	8.0	130	40.6%	3	8.0	142	41.9%	19.0	126.37	3.2%	2

CALCULATING UCSs AND PROPORTIONS FOR EACH RISK CLASS

The next step is to take all combinations falling into the same risk class (from Table 4 in this example) and combine them to calculate the Category UCSs and proportions. Cumulative UCSs and proportions are algebraically calculated from the Category values. Table 5 shows the results of this process.

**Table 5
Risk Class UCSs and Proportions**

Risk Class	Qualifying Total Score	Category		Cumulative	
		UCS	Proportion	UCS	Proportion
Super preferred NT	10	75.4	17.9%	75.4	17.9%
Preferred NT	20	110.8	15.4	91.8	33.2%

UCSs AND PROPORTIONS FOR CRITERIA WITHIN EACH RISK CLASS

The final step is to determine the UCS for each criterion within each risk class. The cumulative values by risk class (from Table 5 in our example) and the UCS from the *Expanded Conversion Table* (last column of Appendix A) are used to calculate the UCS for each criterion within the risk class. Table 6 shows the final result.

**Table 6
UCSs and Proportions for Each Criterion within Each Risk Class**

	Risk Class	
	Super preferred NT	Preferred NT
Total	75.4	91.8
D/C System UCSs carried to Calculation Spreadsheet		
Cholesterol	91.3	110.1
Build	79.0	95.9
Blood Pressure	57.0	70.6

The UCSs shown above for each criterion within each risk class are then carried into the overall calculation spreadsheet of the UCS tool, where they are combined with other K/O type criteria UCSs.

The values for each of the individual criterion are those corresponding to a 75.4 overall UCS for the three criteria. For example, the super preferred risk class has an overall UCS of 75.4. In the last column of the table in Appendix A, 75.4 falls between the rows indicating a DC Criteria Combined scores of 75.14 and 76.24. The 91.3 for cholesterol is similarly interpolated between the Cholesterol scores of 91.1 (corresponding to the 75.15 overall D/C UCS) and 92.4 (corresponding to the 76.24 overall D/C UCS).

Appendix A – Expanded Conversion Table UCS to RRR/Proportion

Overall Table			Individual Criteria									D/C Criteria Combined
	Cumulative		Alcohol / Drug Abuse	BP	Build	Chol	Family History	Motor Vehicle Report	Personal Medical	Tobacco Definition	Misc.	Calc based on program
UCS	RRR	Proportion	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS
D/C Criteria Weights only			0	3	2	3	0	0	0	0	0	8
All Criteria Weights		19	1	3	2	3	3	2	2	2	1	
-23	0.00	0.000%	0	-33	-33	-33	-33	-33	0	0	0	-33.00
-22	0.00	0.000%	0.8	-32.1	-31.8	-31.7	-32.0	-31.9	0.8	0.9	0.8	-31.87
-21	0.00	0.000%	1.6	-31.1	-30.7	-30.4	-31.1	-30.9	1.6	1.7	1.6	-30.75
-20	0.00	0.000%	2.3	-30.2	-29.5	-29.1	-30.1	-29.8	2.3	2.6	2.3	-29.62
-19	0.00	0.000%	3.1	-29.3	-28.3	-27.8	-29.1	-28.7	3.1	3.5	3.1	-28.49
-18	0.00	0.000%	3.9	-28.3	-27.2	-26.5	-28.1	-27.6	3.9	4.3	3.9	-27.37
-17	0.00	0.000%	4.7	-27.4	-26.0	-25.2	-27.2	-26.6	4.7	5.2	4.7	-26.24
-16	0.00	0.000%	5.4	-26.5	-24.9	-24.0	-26.2	-25.5	5.4	6.1	5.4	-25.11
-15	0.00	0.000%	6.2	-25.5	-23.7	-22.7	-25.2	-24.4	6.2	6.9	6.2	-23.99
-14	0.00	0.000%	7.0	-24.6	-22.5	-21.4	-24.3	-23.4	7.0	7.8	7.0	-22.86
-13	0.00	0.000%	7.8	-23.6	-21.4	-20.1	-23.3	-22.3	7.8	8.7	7.8	-21.74
-12	0.00	0.000%	8.6	-22.7	-20.2	-18.8	-22.3	-21.2	8.6	9.5	8.6	-20.61
-11	0.00	0.000%	9.3	-21.8	-19.0	-17.5	-21.4	-20.2	9.3	10.4	9.3	-19.48
-10	0.00	0.000%	10.1	-20.8	-17.9	-16.2	-20.4	-19.1	10.1	11.3	10.1	-18.36
-9	0.00	0.000%	10.9	-19.9	-16.7	-14.9	-19.4	-18.0	10.9	12.1	10.9	-17.23
-8	0.00	0.000%	11.7	-19.0	-15.5	-13.6	-18.4	-16.9	11.7	13.0	11.7	-16.10
-7	0.00	0.000%	12.4	-18.0	-14.4	-12.3	-17.5	-15.9	12.4	13.8	12.4	-14.98
-6	0.00	0.000%	13.2	-17.1	-13.2	-11.0	-16.5	-14.8	13.2	14.7	13.2	-13.85
-5	0.00	0.000%	14.0	-16.2	-12.1	-9.7	-15.5	-13.7	14.0	15.6	14.0	-12.72
-4	0.00	0.000%	14.8	-15.2	-10.9	-8.4	-14.6	-12.7	14.8	16.4	14.8	-11.60
-3	0.00	0.000%	15.6	-14.3	-9.7	-7.2	-13.6	-11.6	15.6	17.3	15.6	-10.47
-2	0.00	0.000%	16.3	-13.4	-8.6	-5.9	-12.6	-10.5	16.3	18.2	16.3	-9.34
-1	0.00	0.000%	17.1	-12.4	-7.4	-4.6	-11.6	-9.5	17.1	19.0	17.1	-8.22
0	0.00	0.000%	17.9	-11.5	-6.2	-3.3	-10.7	-8.4	17.9	19.9	17.9	-7.09
1	52.07	0.164%	18.7	-10.5	-5.1	-2.0	-9.7	-7.3	18.7	20.8	18.7	-5.96
2	52.28	0.335%	19.4	-9.6	-3.9	-0.7	-8.7	-6.2	19.4	21.6	19.4	-4.84
3	52.49	0.512%	20.2	-8.7	-2.7	0.6	-7.8	-5.2	20.2	22.5	20.2	-3.71
4	52.71	0.697%	21.0	-7.7	-1.6	1.9	-6.8	-4.1	21.0	23.4	21.0	-2.59
5	52.93	0.889%	21.8	-6.8	-0.4	3.2	-5.8	-3.0	21.8	24.2	21.8	-1.46
6	53.16	1.088%	22.6	-5.9	0.7	4.5	-4.8	-2.0	22.6	25.1	22.6	-0.33
7	53.39	1.296%	23.3	-4.9	1.9	5.8	-3.9	-0.9	23.3	26.0	23.3	0.79
8	53.63	1.511%	24.1	-4.0	3.1	7.1	-2.9	0.2	24.1	26.8	24.1	1.92
9	53.88	1.735%	24.9	-3.1	4.2	8.4	-1.9	1.2	24.9	27.7	24.9	3.05
10	54.13	1.967%	25.7	-2.1	5.4	9.6	-1.0	2.3	25.7	28.6	25.7	4.17
11	54.38	2.209%	26.4	-1.2	6.6	10.9	0.0	3.4	26.4	29.4	26.4	5.30
12	54.64	2.459%	27.2	-0.3	7.7	12.2	1.0	4.5	27.2	30.3	27.2	6.43
13	54.91	2.720%	28.0	0.7	8.9	13.5	1.9	5.5	28.0	31.2	28.0	7.55
14	55.18	2.990%	28.8	1.6	10.1	14.8	2.9	6.6	28.8	32.0	28.8	8.68
15	55.46	3.271%	29.6	2.6	11.2	16.1	3.9	7.7	29.6	32.9	29.6	9.81
16	55.74	3.562%	30.3	3.5	12.4	17.4	4.9	8.7	30.3	33.8	30.3	10.93
17	56.03	3.865%	31.1	4.4	13.5	18.7	5.8	9.8	31.1	34.6	31.1	12.06
18	56.32	4.179%	31.9	5.4	14.7	20.0	6.8	10.9	31.9	35.5	31.9	13.18
19	56.62	4.505%	32.7	6.3	15.9	21.3	7.8	11.9	32.7	36.4	32.7	14.31

Overall Table			Individual Criteria									D/C Criteria Combined
	Cumulative		Alcohol / Drug Abuse	BP	Build	Chol	Family History	Motor Vehicle Report	Personal Medical	Tobacco Definition	Misc.	Calc based on program
UCS	RRR	Proportion	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS
20	56.92	4.843%	33.4	7.2	17.0	22.6	8.7	13.0	33.4	37.2	33.4	15.44
21	57.23	5.193%	34.2	8.2	18.2	23.9	9.7	14.1	34.2	38.1	34.2	16.56
22	57.55	5.557%	35.0	9.1	19.4	25.2	10.7	15.2	35.0	38.9	35.0	17.69
23	57.87	5.934%	35.8	10.0	20.5	26.5	11.7	16.2	35.8	39.8	35.8	18.82
24	58.20	6.325%	36.6	11.0	21.7	27.7	12.6	17.3	36.6	40.7	36.6	19.94
25	58.53	6.731%	37.3	11.9	22.9	29.0	13.6	18.4	37.3	41.5	37.3	21.07
26	58.87	7.151%	38.1	12.8	24.0	30.3	14.6	19.4	38.1	42.4	38.1	22.20
27	59.21	7.587%	38.9	13.8	25.2	31.6	15.5	20.5	38.9	43.3	38.9	23.32
28	59.56	8.039%	39.7	14.7	26.4	32.9	16.5	21.6	39.7	44.1	39.7	24.45
29	59.91	8.507%	40.4	15.7	27.5	34.2	17.5	22.6	40.4	45.0	40.4	25.58
30	60.27	8.992%	41.2	16.6	28.7	35.5	18.5	23.7	41.2	45.9	41.2	26.70
31	60.63	9.494%	42.0	17.5	29.8	36.8	19.4	24.8	42.0	46.7	42.0	27.83
32	61.00	10.015%	42.8	18.5	31.0	38.1	20.4	25.9	42.8	47.6	42.8	28.96
33	61.37	10.554%	43.6	19.4	32.2	39.4	21.4	26.9	43.6	48.5	43.6	30.08
34	61.75	11.113%	44.3	20.3	33.3	40.7	22.3	28.0	44.3	49.3	44.3	31.21
35	62.13	11.692%	45.1	21.3	34.5	42.0	23.3	29.1	45.1	50.2	45.1	32.33
36	62.52	12.291%	45.9	22.2	35.7	43.3	24.3	30.1	45.9	51.1	45.9	33.46
37	62.91	12.911%	46.7	23.1	36.8	44.5	25.2	31.2	46.7	51.9	46.7	34.59
38	63.31	13.553%	47.4	24.1	38.0	45.8	26.2	32.3	47.4	52.8	47.4	35.71
39	63.71	14.217%	48.2	25.0	39.2	47.1	27.2	33.4	48.2	53.7	48.2	36.84
40	64.12	14.905%	49.0	25.9	40.3	48.4	28.2	34.4	49.0	54.5	49.0	37.97
41	64.53	15.617%	49.8	26.9	41.5	49.7	29.1	35.5	49.8	55.4	49.8	39.09
42	64.95	16.353%	50.6	27.8	42.6	51.0	30.1	36.6	50.6	56.3	50.6	40.22
43	65.37	17.115%	51.3	28.8	43.8	52.3	31.1	37.6	51.3	57.1	51.3	41.35
44	65.80	17.902%	52.1	29.7	45.0	53.6	32.0	38.7	52.1	58.0	52.1	42.47
45	66.24	18.716%	52.9	30.6	46.1	54.9	33.0	39.8	52.9	58.9	52.9	43.60
46	66.68	19.558%	53.7	31.6	47.3	56.2	34.0	40.8	53.7	59.7	53.7	44.73
47	67.13	20.427%	54.4	32.5	48.5	57.5	35.0	41.9	54.4	60.6	54.4	45.85
48	67.58	21.325%	55.2	33.4	49.6	58.8	35.9	43.0	55.2	61.5	55.2	46.98
49	68.04	22.252%	56.0	34.4	50.8	60.1	36.9	44.1	56.0	62.3	56.0	48.11
50	68.50	23.209%	56.8	35.3	52.0	61.3	37.9	45.1	56.8	63.2	56.8	49.23
51	68.97	24.198%	57.6	36.2	53.1	62.6	38.8	46.2	57.6	64.0	57.6	50.36
52	69.44	25.217%	58.3	37.2	54.3	63.9	39.8	47.3	58.3	64.9	58.3	51.48
53	69.92	26.270%	59.1	38.1	55.4	65.2	40.8	48.3	59.1	65.8	59.1	52.61
54	70.40	27.355%	59.9	39.0	56.6	66.5	41.7	49.4	59.9	66.6	59.9	53.74
55	70.89	28.474%	60.7	40.0	57.8	67.8	42.7	50.5	60.7	67.5	60.7	54.86
56	71.38	29.628%	61.4	40.9	58.9	69.1	43.7	51.5	61.4	68.4	61.4	55.99
57	71.88	30.818%	62.2	41.9	60.1	70.4	44.7	52.6	62.2	69.2	62.2	57.12
58	72.38	32.044%	63.0	42.8	61.3	71.7	45.6	53.7	63.0	70.1	63.0	58.24
59	72.89	33.307%	63.8	43.7	62.4	73.0	46.6	54.8	63.8	71.0	63.8	59.37
60	73.40	34.608%	64.6	44.7	63.6	74.3	47.6	55.8	64.6	71.8	64.6	60.50
61	73.92	35.945%	65.3	45.6	64.8	75.6	48.5	56.9	65.3	72.7	65.3	61.62
62	74.44	37.315%	66.1	46.5	65.9	76.9	49.5	58.0	66.1	73.6	66.1	62.75
63	74.96	38.716%	66.9	47.5	67.1	78.1	50.5	59.0	66.9	74.4	66.9	63.88
64	75.49	40.145%	67.7	48.4	68.2	79.4	51.5	60.1	67.7	75.3	67.7	65.00
65	76.02	41.599%	68.4	49.3	69.4	80.7	52.4	61.2	68.4	76.2	68.4	66.13
66	76.55	43.075%	69.2	50.3	70.6	82.0	53.4	62.2	69.2	77.0	69.2	67.26
67	77.07	44.569%	70.0	51.2	71.7	83.3	54.4	63.3	70.0	77.9	70.0	68.38
68	77.59	46.078%	70.8	52.1	72.9	84.6	55.3	64.4	70.8	78.8	70.8	69.51
69	78.11	47.599%	71.6	53.1	74.1	85.9	56.3	65.5	71.6	79.6	71.6	70.63
70	78.63	49.127%	72.3	54.0	75.2	87.2	57.3	66.5	72.3	80.5	72.3	71.76
71	79.14	50.659%	73.1	55.0	76.4	88.5	58.3	67.6	73.1	81.4	73.1	72.89
72	79.65	52.191%	73.9	55.9	77.6	89.8	59.2	68.7	73.9	82.2	73.9	74.01

Overall Table			Individual Criteria									D/C Criteria Combined
UCS	Cumulative		Alcohol / Drug Abuse	BP	Build	Chol	Family History	Motor Vehicle Report	Personal Medical	Tobacco Definition	Misc.	Calc based on program
	RRR	Proportion	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS
73	80.15	53.719%	74.7	56.8	78.7	91.1	60.2	69.7	74.7	83.1	74.7	75.14
74	80.64	55.240%	75.4	57.8	79.9	92.4	61.2	70.8	75.4	84.0	75.4	76.27
75	81.13	56.749%	76.2	58.7	81.0	93.7	62.1	71.9	76.2	84.8	76.2	77.39
76	81.61	58.243%	77.0	59.6	82.2	94.9	63.1	72.9	77.0	85.7	77.0	78.52
77	82.08	59.719%	77.8	60.6	83.4	96.2	64.1	74.0	77.8	86.5	77.8	79.65
78	82.54	61.172%	78.6	61.5	84.5	97.5	65.0	75.1	78.6	87.4	78.6	80.77
79	83.00	62.600%	79.3	62.4	85.7	98.8	66.0	76.2	79.3	88.3	79.3	81.90
80	83.45	63.999%	80.1	63.4	86.9	100.1	67.0	77.2	80.1	89.1	80.1	83.03
81	83.89	65.369%	80.9	64.3	88.0	101.4	68.0	78.3	80.9	90.0	80.9	84.15
82	84.32	66.709%	81.7	65.2	89.2	102.7	68.9	79.4	81.7	90.9	81.7	85.28
83	84.74	68.017%	82.4	66.2	90.4	104.0	69.9	80.4	82.4	91.7	82.4	86.40
84	85.15	69.295%	83.2	67.1	91.5	105.3	70.9	81.5	83.2	92.6	83.2	87.53
85	85.55	70.540%	84.0	68.1	92.7	106.6	71.8	82.6	84.0	93.5	84.0	88.66
86	85.95	71.754%	84.8	69.0	93.8	107.9	72.8	83.6	84.8	94.3	84.8	89.78
87	86.34	72.934%	85.6	69.9	95.0	109.2	73.8	84.7	85.6	95.2	85.6	90.91
88	86.72	74.081%	86.3	70.9	96.2	110.5	74.8	85.8	86.3	96.1	86.3	92.04
89	87.09	75.195%	87.1	71.8	97.3	111.7	75.7	86.9	87.1	96.9	87.1	93.16
90	87.45	76.276%	87.9	72.7	98.5	113.0	76.7	87.9	87.9	97.8	87.9	94.29
91	87.80	77.323%	88.7	73.7	99.7	114.3	77.7	89.0	88.7	98.7	88.7	95.42
92	88.15	78.337%	89.4	74.6	100.8	115.6	78.6	90.1	89.4	99.5	89.4	96.54
93	88.49	79.317%	90.2	75.5	102.0	116.9	79.6	91.1	90.2	100.4	90.2	97.67
94	88.82	80.264%	91.0	76.5	103.2	118.2	80.6	92.2	91.0	101.3	91.0	98.80
95	89.14	81.178%	91.8	77.4	104.3	119.5	81.5	93.3	91.8	102.1	91.8	99.92
96	89.45	82.059%	92.6	78.3	105.5	120.8	82.5	94.4	92.6	103.0	92.6	101.05
97	89.76	82.907%	93.3	79.3	106.6	122.1	83.5	95.4	93.3	103.9	93.3	102.18
98	90.06	83.723%	94.1	80.2	107.8	123.4	84.5	96.5	94.1	104.7	94.1	103.30
99	90.35	84.507%	94.9	81.2	109.0	124.7	85.4	97.6	94.9	105.6	94.9	104.43
100	90.63	85.260%	95.7	82.1	110.1	126.0	86.4	98.6	95.7	106.5	95.7	105.55
101	90.90	85.983%	96.4	83.0	111.3	127.3	87.4	99.7	96.4	107.3	96.4	106.68
102	91.17	86.675%	97.2	84.0	112.5	128.5	88.3	100.8	97.2	108.2	97.2	107.81
103	91.43	87.339%	98.0	84.9	113.6	129.8	89.3	101.8	98.0	109.1	98.0	108.93
104	91.68	87.975%	98.8	85.8	114.8	131.1	90.3	102.9	98.8	109.9	98.8	110.06
105	91.93	88.584%	99.6	86.8	116.0	132.4	91.3	104.0	99.6	110.8	99.6	111.19
106	92.17	89.167%	100.3	87.7	117.1	133.7	92.2	105.1	100.3	111.6	100.3	112.31
107	92.41	89.725%	101.1	88.6	118.3	135.0	93.2	106.1	101.1	112.5	101.1	113.44
108	92.64	90.258%	101.9	89.6	119.5	136.3	94.2	107.2	101.9	113.4	101.9	114.57
109	92.87	90.767%	102.7	90.5	120.6	137.6	95.1	108.3	102.7	114.2	102.7	115.69
110	93.09	91.253%	103.4	91.4	121.8	138.9	96.1	109.3	103.4	115.1	103.4	116.82
111	93.31	91.717%	104.2	92.4	122.9	140.2	97.1	110.4	104.2	116.0	104.2	117.95
112	93.52	92.160%	105.0	93.3	124.1	141.5	98.1	111.5	105.0	116.8	105.0	119.07
113	93.73	92.582%	105.8	94.3	125.3	142.8	99.0	112.5	105.8	117.7	105.8	120.20
114	93.94	92.985%	106.6	95.2	126.4	144.1	100.0	113.6	106.6	118.6	106.6	121.33
115	94.14	93.368%	107.3	96.1	127.6	145.4	101.0	114.7	107.3	119.4	107.3	122.45
116	94.34	93.733%	108.1	97.1	128.8	146.6	101.9	115.8	108.1	120.3	108.1	123.58
117	94.53	94.080%	108.9	98.0	129.9	147.9	102.9	116.8	108.9	121.2	108.9	124.70
118	94.72	94.410%	109.7	98.9	131.1	149.2	103.9	117.9	109.7	122.0	109.7	125.83
119	94.91	94.724%	110.4	99.9	132.3	150.5	104.8	119.0	110.4	122.9	110.4	126.96
120	95.09	95.022%	111.2	100.8	133.4	151.8	105.8	120.0	111.2	123.8	111.2	128.08
121	95.27	95.306%	112.0	101.7	134.6	153.1	106.8	121.1	112.0	124.6	112.0	129.21
122	95.45	95.576%	112.8	102.7	135.7	154.4	107.8	122.2	112.8	125.5	112.8	130.34
123	95.62	95.833%	113.6	103.6	136.9	155.7	108.7	123.2	113.6	126.4	113.6	131.46
124	95.79	96.080%	114.3	104.5	138.1	157.0	109.7	124.3	114.3	127.2	114.3	132.59
125	95.96	96.315%	115.1	105.5	139.2	158.3	110.7	125.4	115.1	128.1	115.1	133.72

Overall Table			Individual Criteria									D/C Criteria Combined
	Cumulative		Alcohol / Drug Abuse	BP	Build	Chol	Family History	Motor Vehicle Report	Personal Medical	Tobacco Definition	Misc.	Calc based on program
UCS	RRR	Proportion	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS	UCS
126	96.13	96.541%	115.9	106.4	140.4	159.6	111.6	126.5	115.9	129.0	115.9	134.84
127	96.30	96.757%	116.7	107.4	141.6	160.9	112.6	127.5	116.7	129.8	116.7	135.97
128	96.47	96.965%	117.4	108.3	142.7	162.2	113.6	128.6	117.4	130.7	117.4	137.10
129	96.64	97.166%	118.2	109.2	143.9	163.4	114.6	129.7	118.2	131.6	118.2	138.22
130	96.81	97.358%	119.0	110.2	145.1	164.7	115.5	130.7	119.0	132.4	119.0	139.35
131	96.98	97.544%	119.8	111.1	146.2	166.0	116.5	131.8	119.8	133.3	119.8	140.48
132	97.15	97.724%	120.6	112.0	147.4	167.3	117.5	132.9	120.6	134.2	120.6	141.60
133	97.32	97.898%	121.3	113.0	148.5	168.6	118.4	133.9	121.3	135.0	121.3	142.73
134	97.49	98.066%	122.1	113.9	149.7	169.9	119.4	135.0	122.1	135.9	122.1	143.85
135	97.66	98.229%	122.9	114.8	150.9	171.2	120.4	136.1	122.9	136.7	122.9	144.98
136	97.83	98.388%	123.7	115.8	152.0	172.5	121.4	137.2	123.7	137.6	123.7	146.11
137	98.00	98.542%	124.4	116.7	153.2	173.8	122.3	138.2	124.4	138.5	124.4	147.23
138	98.17	98.691%	125.2	117.6	154.4	175.1	123.3	139.3	125.2	139.3	125.2	148.36
139	98.35	98.837%	126.0	118.6	155.5	176.4	124.3	140.4	126.0	140.2	126.0	149.49
140	98.53	98.979%	126.8	119.5	156.7	177.7	125.2	141.4	126.8	141.1	126.8	150.61
141	98.71	99.117%	127.6	120.5	157.9	179.0	126.2	142.5	127.6	141.9	127.6	151.74
142	98.89	99.252%	128.3	121.4	159.0	180.2	127.2	143.6	128.3	142.8	128.3	152.87
143	99.07	99.384%	129.1	122.3	160.2	181.5	128.1	144.6	129.1	143.7	129.1	153.99
144	99.25	99.513%	129.9	123.3	161.3	182.8	129.1	145.7	129.9	144.5	129.9	155.12
145	99.43	99.638%	130.7	124.2	162.5	184.1	130.1	146.8	130.7	145.4	130.7	156.25
146	99.62	99.761%	131.4	125.1	163.7	185.4	131.1	147.9	131.4	146.3	131.4	157.37
147	99.81	99.882%	132.2	126.1	164.8	186.7	132.0	148.9	132.2	147.1	132.2	158.50
148	100.00	100.000%	133.0	127.0	166.0	188.0	133.0	150.0	133.0	148.0	133.0	159.63